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Table of Contents on Pages A-5 and A-6

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Table *of* Contents—March 1951

VOL. IX, NO. III

Special Articles

The Mask of Sanity.
HERVEY M. CLECKLEY, M.D. 193
Brain Tumors; A Study of Postoperative Results and Survival Periods.
ALFRED W. ADSON, M.D., HENDRIK J. SVIEN, M.D. AND
HENRY W. DODGE, JR., M.D. 198
The Obstetric Significance of the Posterior Occiput Position.
JOHN L. MCKELVEY, M.D. AND EUGENE J. DIEFENBACH, M.D. 211
Sympathectomy in the Treatment of Buerger's Disease.
LOUIS T. PALUMBO, M.D. 215

Clinical Studies

Treatment of Vaginitis and Cervicitis by the General Practitioner.
KARL JOHN KARNAKY, M.D. 220
Experience with Cortisone in the Treatment of Rheumatoid Arthritis.
PAUL J. BILKA, M.D. AND GORDON CADER, M.D. 231

Diagnostic Clinic

The Effects of Emphysema of the Lungs on the Cerebral and Coronary Circulation. WILLIAM S. MCCANN, M.D. 225

Scientific Exhibit

Congenital Heart Lesions; Study, Diagnosis and Surgical Treatment.
CHARLES D. MARPLE, M.D. 239

General Practice Review

Selection of Patients for "Elective" Cholecystectomy. STANLEY O.
HOERR, M.D. 251
Treatment of Acute Barbiturate Poisoning. THEODORE R. ROBIE, M.D. ... 253
Treatment of Barbiturate Addiction. HARRIS ISBELL, M.D. 256
Treatment of Deep Fungous Infections. LESLIE M. SMITH, M.D. 258

(Continued on page A-6)

Table of Contents — *Continued*

Pediatrics in General Practice

Etiology of Behavior Disorders in Children. HARRY BAKWIN, M.D. 260

Treatment of Pneumonia. JOHN M. ADAMS, M.D. 265

Departments

EDITORIALS 267

Hippocrates in Modern Medicine
Muscular Dystrophy
Effects of ACTH and Cortisone on Rheumatic Fever
Cesarean Section

MEN OF MEDICINE. *Joseph Hill White, M.D.* 271

CONSULTATION SERVICE 277

Indications for Normal Labor in Patient Previously Delivered by Cesarean Section
Prophylaxis and Treatment of Malaria
Pertussis-Diphtheria-Tetanus Immunization
Aluminum Acetate Preparation for Paget's Disease
Sulfathalidine Therapy for Ulcerative Colitis
General Pruritus Without Apparent Cause

LEAVES FROM A DOCTOR'S DIARY. Maurice Chideckel, M.D. A-10

THE HEALING ATOM A-18

NEW DRUGS AND INSTRUMENTS A-53

DR. PEPYS' PAGES. Morris Fishbein, M.D. A-60

THE MEDICAL BOOKMAN A-78

NEWS VIEWS A-88

CEREBRAL PALSY PROGRAM. National Society for Crippled Children and Adults A-100

The Mask of Sanity

HERVEY M. CLECKLEY*

GEORGIA MEDICAL COLLEGE, AUGUSTA

Psychotic disorders may be concealed behind outer manifestations that give little or no suggestion of anything so serious. The traditional psychiatric criteria for diagnosis and classification are seldom helpful and often misleading in such instances. The seriousness of the masked disorder is often overlooked because peripheral functioning and outer appearance simulate so well all that is demanded by current definitions of sanity.

A good many years ago I was struck by the fact that grave social and personal disability in those patients we call psychopaths is concealed behind the disguise of perfect superficial appearance and function. On examination all the findings are negative. In the practical test of conducting his life the patient often shows himself totally incapacitated. It has seemed to me we can accurately say that a true psychiatric disorder, a disorder of such degree as to constitute incompetency in these patients, exists and operates disastrously behind a mask of technical but quite impractical sanity.[1]

There are other disguises behind which other serious personality disorders mislead us. Chamberlain[2] has ably emphasized what he refers to as cryptic depression. Patients so affected may complain only of headache, nausea, a pain in the back, weakness, etc. Some on repeated questioning will admit depression as a minor element in the situation. Some will deny it convincingly and show no evidence of it. I have seen many such patients in whom the history of previous depressive psychosis, many details of the patient's personality and the prompt response to electric shock therapy give indirect but convincing evidence of the invisible illness.

Here it might be said that the potentially more serious condition appears only in a substituted reaction or equivalent—somewhat as the typical grand mal convulsion of epilepsy may not appear, but instead the psychomotor episode.

An old but very pertinent story suggests another sort of masking. It is the one about the psychotic patient connected to the lie detector. He is asked, "Are you really Napoleon Bonaparte?" "Why, of course not," he replies. But the lie detector shows he isn't telling the truth.

Under the term *pseudoneurotic schizophrenia,* Hoch and Polatin[3] discuss what every psychiatrist has often encountered—the patient who one feels sure is a schizophrenic but in whom none of the specifically characteristic features can be demonstrated. Often the only complaints are of vague or minor physical discomforts. Sometimes other features that literally indicate a psychoneurosis, and this only, constitute all that can be brought out. Such patients do not express delusions. They deny hallucinations and show no disorder of thinking as this is ordinarily de-

*From the Department of Psychiatry and Neurology, Georgia Medical College, Augusta, Georgia.

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scribed and no mannerisms or bizarre overt attitudes. They are never grossly irrational in what they express. The history does not show them psychotically deviated in their general behavior until, perhaps, some irreparable psychotic act occurs. Their lack of insight (broader and more profound than in the psychoneurotic) and a peculiar emotional deficit and distortion make one realize, without being able to prove it, that he is dealing with schizophrenia. At length one becomes convinced that these patients do not normally experience and evaluate anything in life, and that this difference is of the sort and degree not found except in schizophrenia. Some of these people eventually develop delusions and hallucinations but many go on year after year fully masked by the psychoneurotic facade.

I recall a hospitalized patient brought many years ago before a staff of psychiatrists for diagnosis. No evidence of delusions or hallucinations was available. Nothing tangible could be brought out to establish the presence of psychosis. During the prolonged interview this patient yawned on numerous occasions between his perfectly cogent replies. All the staff believed that this man was a schizophrenic but in the discussion after he had left no one could clearly or adequately give reasons for such a conviction. Finally one clinician of long experience said, "I can tell he's a praecox from the way he kept on yawning."

Let me hasten to assure my listeners that yawning is not, of itself, enough to establish psychosis. If so I might have good cause at this minute to shudder under my responsibilities—with so many valuable citizens before me whose immediate and wholesale segregation in psychiatric hospitals might be catastrophic to our nation. There was something special and manneristic and hard to describe about the way that patient kept yawning.

Other patients have often been referred to as "ambulatory schizophrenics," probably by analogy with the old term "walking typhoid." The typical case of "walking typhoid" not only seemed virtually free from the usual dire and life-threatening manifestations of his disease but actually did escape them.

Some who might be called ambulatory schizophrenics also show relatively mild disability. I have often examined a woman who for 15 or 20 years has been listening attentively to a voice that comes from her stomach. She follows its advice faithfully. The advice is nearly always good. It is never irrational nor particularly injudicious. Over all these years she has lived as a good citizen in the community, supported herself and enjoyed pleasant relations with her friends. I think it would be a serious mistake and a true injustice to commit her as incompetent and deprive her of her freedom. She seldom mentions her hallucinations except when medically examined, keeping what she regards as a special blessing discreetly to herself. To her acquaintances she does not seem particularly queer or irrational in ordinary matters.

Such a woman might be called "ambulatory" in that she makes a good social adjustment and apparently leads a fairly happy life. She does not, because of her hallucinations, belong in the category of those who are entirely without specific demonstrable signs of psychosis. Her disorder is not thoroughly concealed. It is a sharply circumscribed schizoid disorder rather than masked schizophrenia. Nor does she have the serious and sometimes explosive potentialities for murder, suicide and other acts of inexpressible disaster found in many of the schizophrenics who are fully masked. Some of these are by our present criteria classed as schizoid personalities. I think this is a bad term for patients whose disorder is not minor but, on the contrary, a very serious inner pathology covered over by what is minor.

Such people are nearly always obviously peculiar and maladjusted, even if in some respects successful, but nothing that qualifies by the current standards of law or of medicine as evidence of psychosis can be brought out in their history or by examination. Some of these people are far more dangerous than the average permanent inhabitant of the State Hospital. Despite their superficially correct outer or peripheral functioning they may be, behind this intact but thin facade, profoundly psychotic.

An intelligent young man I have observed from time to time for almost ten years may illustrate an interesting point. Since the early years of his childhood he has been regarded as spoiled, selfish and at times insufferable.

During his teens capricious, demanding and sometimes arrogant behavior offended many of his acquaintances and prompted some of them to refer to him as "goofy," "pretty much of a screw-ball," and so on. For several years this

young man, whom we shall refer to as Spencer, and his widowed mother have lived with a married uncle without contributing substantially to the household expenses.

At age 20 Spencer appeared superficially a sane unit in the social milieu about him. Because of what appeared to be an accumulation of petty dissatisfactions, he had withdrawn from one college and unnecessarily missed a term at another because of a couple of bad colds and a brief gastrointestinal upset. Spencer did well in his studies. His name usually appeared on the honor roll or Dean's list. His classmates and other acquaintances were able to accept him politely, yet apparently no one during his entire life there ever got to know him as a specific person, obtained his confidence or became his friend. He was usually referred to in terms of mild derision and many of his egotistic, ill-tempered or somewhat theatrical acts, and his central aloofness, promoted anecdotes and jokes on the campus. The mild rebuke, "You're as far out in left field as Spencer ————" and similar comparisons became clichés.

In the ordinary sense, however, Spencer was not ostracized. He attended beer parties and dances, but in all social activities his emotional isolation persisted. An excellent tennis player, he made the college team and sometimes officiated at high school or club tournaments. While at home he made demands that sometimes approached the preposterous. On an occasion when his uncle and benefactor refused his almost unlimited use of the car, he insisted for a week or ten days on eating apart from the family. His mother brought his meals on a tray to the room in a far wing of the house which he had a year previously demanded and obtained as a private sanctum; there he practiced on the violin, worked on radio apparatus, enlarged photographs, painted in water-colors, read science-fiction, or merely isolated himself to show indignation and to brood in disgruntled meditation.

At small vexations, such as being called to dinner when he chose to finish a story in a magazine or to tinker further with his radio or photographic apparatus, he sometimes stormed and cursed in truly vindictive and insulting terms. Occasionally in such arguments he seized his mother by the hair, tore her dress and threatened to hurt her seriously. On one occasion he slapped the aunt; on another, blows were exchanged between him and his uncle, who at length subdued him with some difficulty. What words of reconciliation he could be brought to utter after these events were aloof, cold and insulting in tone if not in their literal content.

A SITUATION with more serious potentialities developed one night after a popular girl broke a date with Spencer. In compensation for his ruffled pride he sprang on his mother the sudden demand of a week-end trip to New Orleans. Limited financial resources plus her unwillingness to be so outrageously bullied, and her judgment that such responses should not, for his own good, be encouraged by gratification, made his mother steadfast in resisting his peremptory, vociferous and threatening demands. He became more vehement than usual, cuffed his mother up pretty thoroughly, brandished a poker at his aunt, who had come in response to the mother's outcries, and ended by driving her from the house. At the appearance of his uncle he momentarily retreated, obtained possession of the uncle's loaded .38 caliber revolver and, threatening to shoot (but not yet pointing the weapon), he made his way to the personal room already mentioned, in which he at once locked himself.

A little time was given for tempers to cool. Then mother, aunt and uncle each tried to reason with Spencer. He had now apparently become calm. He spoke quietly and coolly, but persisted in his promise of shooting at the first indication of efforts by anyone to force the door or to enter the room by a window. After trying until past midnight to persuade Spencer to modify his position, the family finally called in the police. After considerable discussion through the door two officers succeeded in getting him to unlock it. They freely admitted gratification at their first glimpse that showed the loaded revolver lying on a table, for Spencer had not withdrawn his threat.

Many of this boy's relatives, friends of the family and some of his school teachers are positive that he is merely an egregious example of what pampering and lack of discipline can do to the young. One harassed physician who has often attended him has expressed the opinion that nothing is wrong with Spencer that couldn't be cured by generous and appropriate applications of a belt strap or a bed-slat.

The long story of his tantrums, irresponsi-

bility, ingratitude, unaccountable and apparently voluntary failures, etc., seems quite typical of the well-known psychopath. Even brief contact with the patient himself contradicts such an impression. He shows indications of real anxiety and despair behind his brittle aloofness and disdain. Evidence of personally felt conflict and distress is printed on the very surface of this boy. Over the years he has been examined by a number of psychiatrists. All felt, despite there being no evidence of the technicalities that officially establish psychosis, that his disorder was schizoid in type.

A couple of years ago during a PENTOTHAL interview he once expressed to a psychiatrist his conviction that he communicated with and controlled armies of small steel men located underground in the Alps and in the Rocky Mountains. This delusion does not apparently occupy much of his attention and probably does little to determine his behavior. He now denies it outright.

This transient glimpse through Spencer's outer covering has revealed convincing evidence of psychosis and we are perhaps no longer justified in classifying him with those whose specific disorder is fully disguised.

WHAT has concealed Spencer's inner psychotic state is not, of course, an outer appearance of real normality, of ordinary mental health. He has always shown what could be recognized as eccentricity, oddness of manner, peculiarity and unpredictability of emotional response. We might say he is a very seriously ill (psychotic) person masked by what is officially classified as a minor, nonpsychotic state—schizoid personality. There are many similar patients who do not afford us even a transient glimpse within at any technical evidence of psychosis.

Serious depressive illness may, we find, be entirely concealed and misrepresented by somatic complaints, schizophrenia by manifestations classed as psychoneurotic and by other characteristics generally regarded as relatively minor pathology. This is true not only, as is well recognized, of patients in a prodromal or incipient status, but apparently also of those who are very seriously disordered over many years—perhaps for life—while retaining an outer functioning that, according to our current standards, establishes them as "sane."

Like such patients as these, the real psychopath also has a concealed inner but very real psychopathology. Unlike all of the other types his central personality "lesions" are covered over not by peripheral or surface functioning typical of another and lesser disorder, but by a perfect mask of genuine sanity, of robust mental health. The typical psychopath is not, like Spencer, a person whose queerness emerges on ordinary examination. The psychopath, on the contrary, is affable, confident, quite at his ease, socially appealing. On examination he appears free not only of what indicates psychosis but also of everything that might suggest any sort of inadequacy or moral frailty.

He may have cashed 40 bad checks, lost 19 excellent jobs at which he had shown he could succeed, and casually walked out on his pregnant wife and three young children, leaving them destitute and with no notion of his whereabouts or intentions. Once or twice he has, perhaps, parked his own car and left it to steal another, knowing that he would be caught and imprisoned for the deed. He has been put in psychiatric hospitals two dozen times, in jails 50 times and tens of thousands of dollars have been spent by his family to make good his forgeries, embezzlements, disturbances of the peace, thefts and other depredations.

Despite this career and his clear knowledge of it, he is not only free of delusions but also, apparently, free even of anxiety or chagrin. Though he has violated his most solemn vows a hundred times he gives his word of honor, looking one straight in the eye. He expects it to be taken very seriously and so convincing is his manner, so free is it of any suggestion of insincerity, that his expectations are usually fulfilled.

After expressing what, in words, is profound understanding of his past mistakes, more than adequate remorse, and excellent plans for a successful future, he immediately, on regaining his freedom, undertakes new and obvious follies that bring him back to jail or to the psychiatric hospital. Only the most trivial and transient motivation or impulse seems to prompt these acts by which he brings such misfortune upon his family, the community, and himself. Though his career often gives practical evidence of far greater incompetence and psychiatric disorder than the average long term state hospital patient, his intact verbal and peripheral functioning conforms to all the criteria by which medical sanity and legal competence are determined.

I THINK it is important for us to revise these criteria. Problems and dangers presented by the masked schizophrenic demand it. The psychopath demands it more urgently. In our efforts to make changes in our concepts and our standards, the major point to observe, I believe, is that the severity and reality of personality disorder are not necessarily proportionate to what we can demonstrate in the superficial or peripheral area of functioning to which the determination of psychosis and incompetence is still arbitrarily confined.

One might say, how shall we come to agreement about the invisible or difficultly demonstrated pathologic state that might be surmised by various psychiatrists—perhaps even "crackpot psychiatrists"—beneath the outer sanity of a patient? I think the answer lies not in proof of conflicting theories about the presence of possible pathology or its precise nature. It lies in giving adequate attention to, and accepting as evidence, the facts of a patient's behavior, the rich material accessible to any layman and independent of academic theories. If we can let ourselves do this we shall be able better to protect society and our patients and, in vivid contrast to our situation today, we shall be able to keep these seriously disabled patients under treatment.

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CHARCOT AND FREUD—LEADERS IN A NEW CONCEPT OF MEDICINE

ALTHOUGH THE NAME of Sigmund Freud (1856-1939) has become familiar to almost everyone who has read a novel or seen a movie in the last few years, not quite so generally famed is the man under whom he studied—one of the outstanding teachers of his day—Jean-Martin Charcot (1825-1893).

In his clinic at La Salpêtrière, France, Charcot developed the most famous neurologic clinic of modern times. Here he not only made many fundamental contributions to neurology, clinical medicine and geriatrics, but also exerted a great influence in the training of many young physicians who came to work with him. Of these, the best known and the one who has been a dominant influence on physicians in virtually every field was the young man from Vienna, Sigmund Freud. For whether they accept his concepts or not, no one questions his establishment of an entirely new approach to the diagnosis and treatment of psychiatric disorders and, in fact, to medicine as a whole.

As one writer has said, "Darwin and Huxley, by viewing man from a zoological standpoint, had profoundly influenced the current of medical thought. In like manner Freud, by his discovery of the unconscious mind, altered the trend of medicine . . . showed, moreover, that there was no clear borderline between normal and abnormal psychology, and his ideas have assumed importance in almost every field of human activity."

The sketch of Freud is adapted from a statue by Olem Nemon in the New York Psychoanalytic Institute. Reprints of Edmund Kopietz' cover design, mounted and ready for framing, may be obtained from *Postgraduate Medicine*, 516 Essex Building, Minneapolis 3, Minnesota. $1.00.

Brain Tumors

A STUDY OF POSTOPERATIVE RESULTS AND SURVIVAL PERIODS

ALFRED W. ADSON,[1] HENDRIK J. SVIEN[1] AND HENRY W. DODGE, JR.[2]

MAYO CLINIC AND MAYO FOUNDATION, ROCHESTER

In this study we shall attempt to evaluate the results and record the survival periods of patients following operative procedures for the various tumors encountered within the cranium. Surgical treatment of brain tumors has made rapid progress in recent years due to the improvement in cerebral localization of tumors and the improvement in surgical technics. Asepsis and methods for the control of hemorrhage and surgical shock have reduced the surgical mortality. The employment of the electrosurgical knife and the electrocoagulating needle has made it possible to remove tumors which previously were inoperable.

The fact that many tumors are encapsulated and benign makes it possible to remove them completely. Radical resection of gliomas is likewise possible when they arise in silent areas of the brain. Irradiation therapy is effective in ameliorating the symptoms produced by vascular tumors.

DIAGNOSIS

A thoroughly elicited history of the patient's complaints, with a general examination, assists in distinguishing between coexisting diseases and the early symptoms of increased intracranial pressure which are characterized by headache, vomiting and choked optic disks. Ambulatory patients have headache daily in the early morning hours and frequently are awakened by it about 4:00 A.M. Vomiting due to increased intracranial pressure is of the projectile type, and is often associated with headache and with movements of the head. Pain in the occipital region associated with rigidity of the neck is an accompanying symptom of infratentorial tumors. Papilledema and choked optic disks develop when the free flow of cerebrospinal fluid is impaired by an expanding lesion within the cranium. However, choked disks may result from other lesions, such as retrobulbar neuritis, intra-orbital tumors, hydrocephalus and inflammatory lesions of the meninges and brain.

All patients with symptoms that suggest the presence of a cerebral lesion should be given a thorough neurologic examination. Symptoms produced by brain tumors vary according to the origin, position, rate of growth, size and pathologic features of the tumor. Each tumor produces a chain of symptoms peculiar to its own life cycle. It is apparent that lesions of the frontal lobes will give rise to psychic and per-

[1]Section on Neurologic Surgery, Mayo Clinic, Rochester, Minnesota.

[2]Fellow in Neurosurgery, Mayo Foundation, Rochester, Minnesota.

Presented at the thirty-fifth annual Assembly of the Interstate Postgraduate Medical Association, Chicago, 1950.

sonality changes. Those arising in the speech and motor centers will produce aphasia, apraxia, jacksonian and grand mal convulsions, increased activity of reflexes, monoplegia and hemiplegia. Other symptoms develop as respective centers, nuclei and tracts become invaded or destroyed or deprived of their normal blood supply. Certain tumors, such as those situated in the sella turcica, the chiasmal region and the cerebellopontine angle, may give rise to symptoms of localization before symptoms of increased intracranial pressure are manifested.

Ophthalmologic examinations reveal the presence or absence of choked disks, optic atrophy, disturbance in ocular movements, nystagmus and defects in perimetric fields. These findings are extremely valuable in the localization and differentiation of intracranial lesions.

Plain cranial roentgenograms, made in the lateral and anteroposterior positions, with an occasional set of stereoscopic roentgenograms, will reveal evidence of increased intracranial pressure by the presence of convolutional markings in the calvarium and destruction of the clinoid processes. Evidence of a tumor which aids in localization is presented by enlargement of the sella turcica, erosions or hyperostosis of the skull and by deposits of calcium in a neoplasm or vascular lesion.

Routine laboratory tests are employed much as they would be in completing a thorough general examination. Spinal puncture should be avoided in the presence of choked disks, since herniation of the brain may take place through the tentorial notch or the foramen magnum, and death may result.

Special examinations and diagnostic aids are available, but they should be used only when necessary to complete the evidence for a diagnosis or for a differential diagnosis of a cerebral lesion. Pneumoencephalography and pneumoventriculography are procedures in which the cerebrospinal fluid is removed and replaced by air or oxygen. The pneumoencephalogram is made by effecting an exchange of cerebrospinal fluid and oxygen through a spinal puncture in the lumbar area. This procedure is employed only in the absence of choked optic disks. The pneumoventriculogram is made by withdrawing the cerebrospinal fluid directly from the lateral ventricles and replacing it with oxygen or air. This is accomplished by making trephine openings through the parietal bones over the posterior horns of the lateral ventricles and on

ALFRED W. ADSON

introducing a brain cannula into the lateral ventricles. After the cerebrospinal fluid has been removed and replaced with oxygen, a series of roentgenograms is made. Since the air or oxygen is less dense than cerebrospinal fluid, the roentgenograms will reveal the outlines of the ventricles and subarachnoid spaces. Displacement or distortion of the ventricles or subarachnoid spaces suggests the presence of an expanding lesion, internal hydrocephalus or cortical atrophy.

Electroencephalography is one of the newer procedures employed in the localization of brain tumors. The purpose of an electroencephalogram is to enable the diagnostician to determine whether or not the normal brain waves have been disturbed by neoplasm. Present knowledge of electroencephalography makes it a reasonable aid in the differential diagnosis, although its results are not infallible.

Roentgenographic studies of cerebral circulation with a contrast medium (diodrast) have contributed much help in distinguishing lesions within and about the brain. Some neurosurgeons prefer to employ angiography to pneumoencephalography, since they believe the sequelae appear to be less frequent.

Certain dyes such as fluorescein, which has a special affinity for neoplastic tissue, have been injected intravenously just prior to operation in order to enable the surgeon better to visualize the boundaries of infiltrating gliomas. Moore and others[1] have been able to combine a radioactive isotope with fluorescein in such a way that when the combination is injected intravenously, it has a tendency to concentrate in a cerebral neoplasm. Thus it becomes possible to detect a brain tumor by the use of a Geiger counter. Studies with dyes carried out independently or in combination with the radioactive isotopes are still in the investigative stage.

PATHOLOGIC CLASSIFICATION

From the surgeon's standpoint, brain tumors[2] can be conveniently classified pathologically as follows: (1) tumors of the envelopes of the brain (meningiomas and sarcomas); (2) tumors of special structures (pituitary adenomas and pinealomas); (3) tumors arising from heterotopic rests (epidermoids, dermoids, chordomas and craniopharyngiomas); (4) tumors arising from cranial nerves (neurofibromas); (5) tumors arising from vascular tissue (angiomas, hemangiomas, hemangio-endotheliomas and others); (6) metastatic malignant lesions and (7) tumors arising from neural elements (gliomas).

The pathologic changes and the degree of malignancy of the first six of these subdivisions are fairly well understood and uniformly determined. Thus, it is known that approximately 10 per cent of meningiomas are malignant and that certain adenomas of the pituitary show evidence of malignant change. However, with the present histogenetic concept of the gliomas and the classification based on this concept, the neurosurgeon is confronted with 16 or 17 subdivisions and obtains only a relative index of degree of malignancy of each.

We believed that simplification of the present classification of gliomas together with the grading of the degree of malignancy within each group would be highly advantageous to the neurosurgeon. We applied the concept which is rather universally held by general pathologists in dealing with carcinoma elsewhere in the body, namely, that malignant change represents anaplastic transformation of adult cells. The neural tissue of the brain is made up of four different types of cells, and consequently when the concept of anaplastic change is applied to the study of gliomas,[3-16] four types of gliomas may arise from the neural elements of the central nervous system; namely, (1) astrocytoma, (2) ependymoma, (3) oligodendroglioma and (4) neurocytoma or neuro-astrocytoma (Table 1). Medulloblastoma also must be included as an entity because of its relatively constant histologic structure and its frequency of occurrence.

TABLE 1

SUGGESTED MODIFICATION OF CLASSIFICATION OF GLIOMAS

NEW	OLD WITH NEW IN PARENTHESES
Astrocytoma, grade 1 to 4	Astrocytoma (astrocytoma, grade 1) Astroblastoma (astrocytoma, grade 2) Polar spongioblastoma (obsolete) Glioblastoma multiforme (astrocytoma, grades 3 and 4)
Ependymoma, grade 1 to 4	Ependymoma (ependymoma, grade 1) Ependymoblastoma (ependymoma, grades 2 to 4) Neuro-epithelioma (obsolete) Medullo-epithelioma (ependymoma, grade 4)
Oligodendroglioma, grade 1 to 4	Oligodendroglioma (oligodendroglioma, grade 1) Oligodendroblastoma (oligodendroblastoma, grades 2 to 4)
Neuro-astrocytoma	Neurocytoma, Ganglioneuroma, Gangliocytoma, Ganglioglioma (neuro-astrocytoma, grade 1)
	Neuroblastoma, Spongioneuroblastoma, Glioneuroblastoma, Others (neuro-astrocytoma, grades 2 to 4)
Medulloblastoma	Medulloblastoma

SURGICAL CONSIDERATIONS OF INTRACRANIAL LESIONS

THE attitude of the patient suffering from a brain tumor as well as the attitude of the medical profession toward the patient thus afflicted have changed tremendously during the past 25 years. The patient has lost much of his suspicion and fear of cranial operations, and the doctor has come to recognize the early symptoms of an intracranial neoplasm and no longer looks on this patient's condition as hopeless and the tumor as inoperable.

It is quite true that the tumors of the basal ganglia, brain stem, pons and medulla are beyond the reach of the neurosurgeon. There are also large, diffuse and infiltrating tumors of the

hemispheres which cannot be completely removed. However, when we reviewed a large series of cases in an attempt to evaluate results and survival periods, we were impressed by the fact that much has been accomplished. Many patients have been cured; others have been relieved of their symptoms for years. One of us (Adson) who has been performing neurosurgical operations for 33 years frequently has former patients make social calls who have been operated on 10, 15, 20 and 25 years previously. He has recently performed an exploratory operation on one patient on whom he operated for a cystic astrocytoma 28 years ago, and on another patient on whom he operated for a cystic hemangio-endothelioma of the cerebellum 18 years ago. Both patients were reasonably well and were living normal lives until six months prior to re-admission. At re-operation both patients were found to have cerebral cysts which were evacuated.

The incidence of brain tumors is much higher than it usually is suspected to be. Berkson, our statistician, following a study of all patients with tumors who were examined and treated in the Mayo Clinic, found that tumors of the central nervous system represented 9 per cent of the tumor group. They were within about 1 per cent as common as carcinoma of the stomach, colon, rectum or breast (Table 2).

TABLE 2

RELATIVE FREQUENCY OF TUMORS: COMPARISON OF TUMORS OF THE CENTRAL NERVOUS SYSTEM WITH THOSE OF OTHER ORGANS

LESION	PER CENT OF ALL TUMORS
Carcinoma of stomach	10.2
Carcinoma of colon	9.5
Carcinoma of rectum	10.4
Carcinoma of breast	9.9
Tumors of central nervous system*	9.0

*About 20 per cent of all tumors of the central nervous system are in the spinal canal.

Since tumors within the cranium may arise from the coverings of the brain, nerve roots, blood vessels, fetal rests and pituitary gland as well as from neural elements, it is obvious that the surgical results will vary depending on the accessibility and pathologic nature of the neoplasms. We have been able to establish the postoperative survival periods on some of the tumor groups but not on all of them since the series is rather extensive, and the follow-up study is time-consuming. However, Tables 3 to 6 are most illuminating.

Table 3 presents data on a three-year study of tumors verified either at surgery or necropsy during the years of 1946, 1947 and 1948. It gives the frequency of the occurrence of the various tumors and the operative procedures employed. It reveals several interesting facts: (1) less than half of the tumors arise from neural elements and fall in the glioma group; (2) approximately half the tumors are completely removed or have been removed by the intracapsular method, and (3) in addition, subtotal or partial removal was effected in another large group. All of this emphasizes the fact that early diagnosis is imperative and that surgical procedures are employed when indicated.

Brain tumors for surgical consideration are divided into two large groups: one includes the encapsulated and accessible tumors and the other includes the diffuse, infiltrating and inaccessible tumors. It is apparent that the encapsulated accessible tumor lends itself best to surgical removal; however, the infiltrating tumor, when situated in a silent area, also can be removed by removing the tumor with brain tissue about it. More often than not, in the group of nonencapsulated tumors, the surgeon is compelled to perform subtotal resection, removing necrotic, cystic material with mural nodules and tumor masses from within the tumor in order to avoid increasing the existing paralysis. Radical resections of diffuse infiltrating tumors are avoided if their removal may cause hemiplegia. We prefer to secure a shorter period of relief and preservation of more normal function than an extended, indefinite period of relief and spastic hemiplegia. Decompression should never be substituted for removal of tumor when radical operation is at all feasible, but decompression does serve as an auxiliary measure when only subtotal resection of tumors can be accomplished and serves as a measure of temporary relief when a tumor is inoperable.

WHEN the corpus callosum, basal nuclei, brain stem, pons and medulla are involved by inoperable tumors, the surgical problem is extremely difficult because decompression

TABLE 3

BRAIN TUMORS ENCOUNTERED DURING THE YEARS 1946, 1947 AND 1948

TUMOR GROUPS	NUMBER	SURGICAL TREATMENT					REMARKS
		REMOVED	INTRA-CAPSULAR REMOVAL	PARTIAL REMOVAL AND DECOM-PRESSION	BIOPSY AND DECOM-PRESSION	NONE	
Group 1							
Meningioma	137	95		34	5	3*	129 supratentorial
Sarcoma	3				3		8 infratentorial
Group 2							
Pituitary adenoma	70		70				2 malignant
Pinealoma	4	1			3		
Group 3							
Craniopharyngioma	17	5		12			
Epidermoid, dermoid and so forth Cholesteatoma							
Chordoma	9	3		6			
Group 4							
Neurofibroma of 8th, 1st and 5th cranial nerves	45	17	28				
Group 5							
Vascular tumor	15	6		5		4*	
Group 6							
Metastatic tumor	19			6	13		
Group 7							
Astrocytoma (1-4)	187	45		108	30	4*	
Oligodendroglioma	45	15		26	4		
Neurocytoma	3			3			
Ependymoma (1-4)	34	9		19	5	1*	40% supratentorial†
Medulloblastoma	15	2		9	3	1*	60% infratentorial†
GRAND TOTAL	603	198	98	228	66	13	

*Died without surgical procedures.
†Per cent of ependymomas.

gives little, if any, relief. Many of these tumors are of the variety known as "medulloblastoma," "glioblastoma multiforme" (astrocytoma, grades 3 and 4 in our classification, Table 1). Roentgen or radium therapy may offer temporary relief. When irradiation therapy is indicated, roentgen therapy constitutes the most suitable type of therapy for adults who will cooperate, since it can be administered in massive doses in a short period. Radium is most suitable in treatment of similar lesions of children or uncooperative patients, since the blocks of radium can be bandaged on the heads of patients. It always should be remembered that roentgen or radium therapy may increase symptoms for the first 10 days due to swelling and edema of tumor cells. Treatment of these symptoms may require dehydration, which can be accomplished by limitation of intake of fluids and administration of diuretics and saline cathartics.

Meningiomas—Meningiomas which represent 22 per cent of the cerebral tumors are nodular, rounded, circumscribed and encapsulated tumors; they usually are vascular and usually slowly growing, although a small number of them are malignant. Frequently they contain concentrically calcified masses called "psammomas" which are so numerous that the tumors are called "psammomas." The cells tend to grow in whorls. They are fibroblastic in structure and arise from arachnoid villi. They often are situated along the large venous sinuses of the cranial cavity, in the olfactory grooves, along the wings of the sphenoid and the crest of the sella turcica. They are distinctly encapsulated and do not invade the brain but displace it. The

tumor cells soon invade the dura and often continue on into the adjacent skull, giving rise to hyperostosis and spurs of bone which grow inward into the tumor. Thus in order to effect a complete removal of a meningioma, it is necessary to remove all of the invaded dura and bone (Figures 1 and 2).

The operation of choice is to remove the tumor mass in toto (Figure 3). However, when this is impossible, the electrosurgical knife or loop is employed and the tumor is removed piece by piece. Hemorrhage is controlled by electrocoagulation.

FIGURE 1 *(bottom)*. Small meningioma removed in toto with dural attachment from the lesser wing of the sphenoid.

FIGURE 2 *(top)*. Average-sized meningioma removed in toto from the right frontal lobe.

SURGICAL results are most gratifying. Many complete cures are effected. Trauma to the brain and blood vessels during the operation must be avoided in order to prevent neurologic deficits and decrease the incidence of post-traumatic epilepsy. Incomplete removal of meningiomas will result in recurrence. Since they grow slowly, the average interval between the time of the original operation and reappearance of symptoms is seven years. Meningiomas with malignant change, although they apparently have been removed completely, will produce symptoms of recurrence in three to five years.

Sarcomas—Sarcomas are much more rare than they were supposed to have been at one time. Usually, they are highly malignant tumors arising from the connective tissue around the blood vessels. There is usually a line of demarcation about the tumor mass. Rarely is it possible to effect complete removal. Irradiation therapy may retard its recurrence. The lesions occur most commonly among young adult persons.

Pituitary tumors—These tumors which represent 11 per cent of all cerebral tumors include neoplasms which arise from the three primary structures of the pituitary gland. The chromophode adenoma usually is responsible for the hypopituitary syndrome, Fröhlich's syndrome in children or dyspituitarism in adults, whereas the chromophile adenoma is found in cases of hyperpituitarism, which results in gigantism or acromegalia. Tumors of the craniopharyngeal duct arise from Rathke's pouch. All these and other variations of pituitary tumors are capable of enlarging the sella turcica and of producing suprasellar extension. They usually produce some form of hemianopsia, of which bitemporal hemianopsia is the most common but it is obvious that the position and extent of the tumor will cause these manifestations to vary from time to time. They rarely produce papilledema, but frequently give rise to optic atrophy preceded by pallor of either side of the margin of the optic disk. The choked disks develop only when the tumor extends upward and posteriorly into the third ventricle, resulting in block of one foramen or both foramina of Monro, and the most common tumors which produce such symptoms are craniopharyngiomas. Although enlargement of the sella turcica is considered to be a sign pathognomonic of pituitary tumor, it cannot be relied on as an absolute sign, since the posterior clinoid processes, and even the sella turcica, may be eroded in the presence of increased intracranial pressure caused by cerebral tumors in other positions. Therefore, the diagnosis of tumor of the pituitary body usually is based on hypopituitarism or hyperpituitarism plus enlargement or erosion of the sella turcica, defects in the perimetric field and changes in the ocular fundi.

The surgical results depend directly on the size and position of the tumor and on the de-

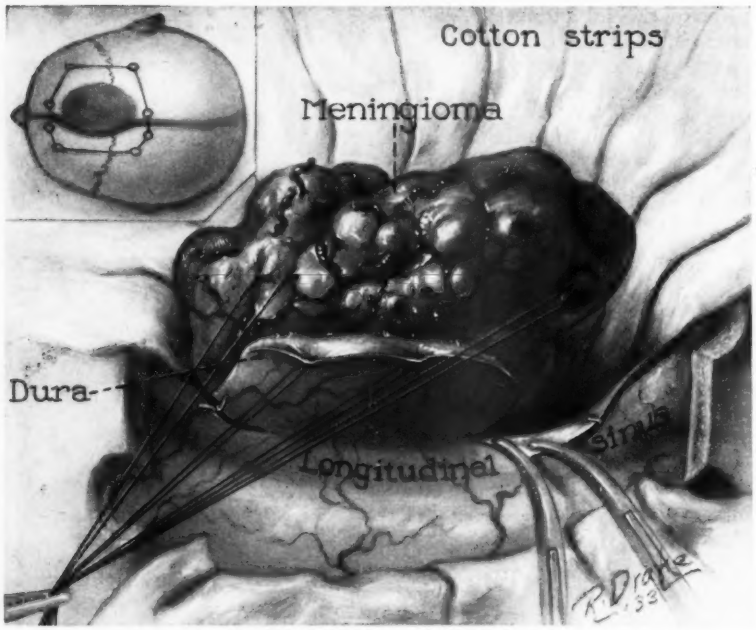

FIGURE 3. Removal of a right parasagittal meningioma.

gree of destruction of the pituitary gland. The intracapsular enucleation through the transfrontal approach has superseded the transnasal approach and is now the operation of choice. Main purpose of the operation is to remove the tumor in order thoroughly to decompress the optic nerves and chiasm with the hope that complete restitution of vision will take place. The procedure consists of an intracapsular enucleation of tumor substance along with a resection of the suprasellar portion of the tumor capsule. The problem becomes difficult and impossible at times when the suprasellar portion of the tumor extends laterally between the optic nerve and the internal carotid artery or is adherent to the floor of the third ventricle.

The metabolic disturbances produced by chromophobe adenomas produce at times a most serious problem since a deficiency of pituitary substance lowers the formation of ketosteroids and the patient's vigor to endure surgery. Though we have been able to perform a satisfactory operation, some of the patients need supportive endocrine therapy for indefinite periods. The two substances usually administered are thyroid and testosterone. Inhalations of powdered whole pituitary gland may have to be employed if polydipsia and polyuria should be present before or develop after operation.

The effectiveness of roentgen therapy in the treatment of chromophobe adenomas has been a debatable question. In the occasional case, it has appeared to have reduced the size of the tumor with a resulting improvement in the perimetric fields. Some neurosurgeons advise a postoperative course of roentgen therapy as a prophylactic measure against recurrence. We have had patients continue in good health following surgery for 20 years, and others have had recurrences within 18 months.

The chromophile adenomas of the pituitary gland do definitely shrink, and the symptoms remain stationary after irradiation therapy, which is at present the accepted method of treatment.

Pinealomas—These occur infrequently, but when they do occur, they present a difficult surgical problem since they are most inaccessible, are rarely cystic and are usually malignant. If radical removal is attempted, extensive craniotomy and frequently resection of the occipital lobe are required to expose the pinealoma.

Craniopharyngiomas—The craniopharyngioma presents many problems. The first is a metabolic one and then visual disturbances. Frequently it is impossible to remove all of the supracapsular portion of a cystic mass and the

incidence of recurrence is high. Radical removal of craniopharyngiomas does offer relief for many years in some cases. Roentgen therapy may retard recurrence. Many of the patients need supportive endocrine therapy.

Epidermoid tumors, dermoid tumors and teratomas—Epidermoid tumors result from congenital rests.[17] They are characterized by large cysts containing flaky, desquamated epithelium and have the appearance of mother-of-pearl. The capsule of the tumor is composed of epidermis.

Dermoid tumors are similar to epidermoid tumors, except that in addition to the epidermis they contain sweat glands, sebaceous glands or hairs, or hair follicles. The contents also usually resemble those of epidermoid tumors.

Teratomas are similar to dermoid tumors, except that in addition they have some structures which contain mesoderm, such as bone and cartilage.

Epidermoid and dermoid tumors and teratomas occur infrequently and are usually benign. The teratomas may contain malignant cells. They are situated in the midline of the brain, both supratentorially and infratentorially. They vary in size from small globoid masses to masses that fill an entire fossa of the skull. Complete removal and cures have been effected. Too often one is unable to remove all of the mass with its capsule, thus giving only temporary relief.

Chordomas—These arise from rests of the notochord and develop at the clivus blumenbachii. They grow slowly and are characterized pathologically by the physaliferous cells. The growths occur infrequently. When they do occur, they may fill the middle fossa and displace the brain dorsally. They may extend anteriorly, invade the sphenoid and produce chiasmal symptoms or extend posteriorly to invade the occipital bone and produce symptoms of pontine pressure. It is impossible to remove all of the tumor, but radical removal of the tumor will give symptomatic relief for months and many years in the occasional case.

Neurofibromas—Neurofibromas and perineural fibroblastomas arise from cranial and spinal nerves. They are encapsulated, circumscribed and usually grow slowly. They are characterized by regions of degeneration or small cysts, blood pigment, cells containing fat (so-called foam cells), interlacing fibrils and palisading of the nuclei. Usually, all these characteristics are present, but sometimes only one or two are seen. Occasionally, these tumors simulate meningiomas on the one hand and astrocytomas on the other. The eighth cranial nerve is most commonly involved. When the optic nerve is involved, the lesion is usually a glioma of the astrocytoma type.

The neuromas or neurofibromas of the acoustic nerve make up 7.5 per cent of all intracranial tumors. Since they vary in size, position and in entanglement of cranial nerves, the surgical procedures must be altered to fit the situation. Total removal of the tumor is the operation of choice and is indicated if the tumor is small and can be removed without injury to adjacent cranial nerves, arteries or the pons. The intracapsular enucleation of the tumor is the procedure most often employed (Figure 4). Whether or not recurrence will take place after intracapsular enucleation depends on the degree of differentiation within the tumor cells. The yellow, cystic cheeselike tumor rarely recurs. If it is impossible to remove all of the pink tumor tissue from within the capsule, recurrence will follow. This may be avoided to some degree by radium treatment, placing radium needles within the capsule and thus administering 500 milligram hours of radium.

The mortality rate following surgery for the removal of acoustic neuromas is still rather high, averaging from 10 to 20 per cent. It depends on the preoperative involvement of the ninth and tenth cranial nerves and the pressure on, and displacement of, the pons and cerebellar lobe by the tumor. The more radical the operation, the greater will be the mortality.

Lipomas—These are extremely rare tumors of the nervous system, but when they do occur, they contain young and adult adipose connective tissue cells similar to the cells of the tissue in which they occur in other parts of the body.

Vascular tumors—Blood vessel tumors of the central nervous system may be divided into two groups: (1) angiomatous malformations, and (2) neoplasms of the blood vessels. This second group is made up of angioblastic elements and varies in cellular activity. They have been subdivided as (a) capillary hemangioma; (b) hemangio-endothelioma; (c) capillary hemangio-endoblastoma, and (d) hemangiosarcoma.

Angioblastomas vary in size from 1.0 to 5 cm. in diameter. The tumor is reddish and firm in consistency and usually associated with a cyst.

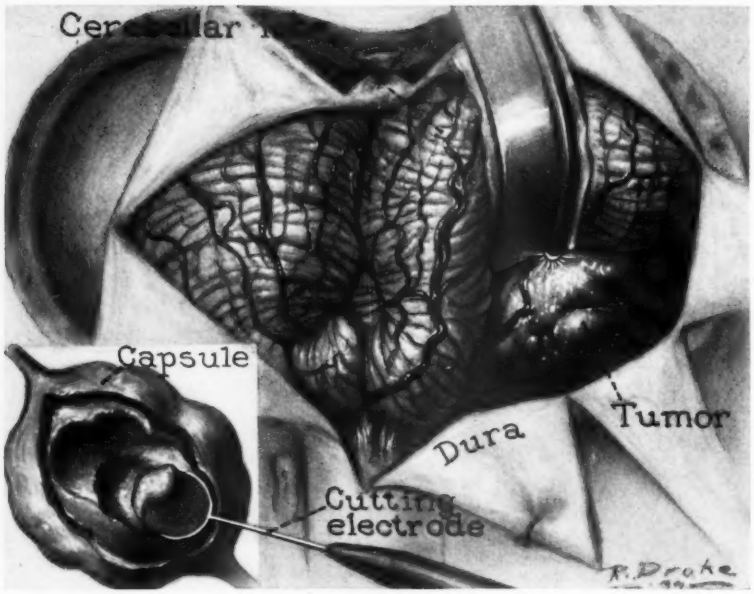

FIGURE 4. Acoustic neurofibroma. Intracapsular enucleation with the electrosurgical loop.

Although hemangio-endotheliomas occur most frequently in the cerebellum, they have been found in all parts of the nervous system. A tumor of this sort frequently occurs as a small tumor nodule (so-called mural nodule) on the wall of a large, smooth-walled cyst. They usually are composed of numerous dilated capillaries with large, swollen endothelial cells lining the lumen. These endothelial cells usually contain numerous droplets of fat. These tumors are occasionally associated with hemangiomas of the eye or of the skin, and with a cystic pancreas, spleen, liver or cystic kidneys; they constitute what is sometimes called "Lindau's disease."

Blood vessel tumors usually lend themselves to radical treatment. If the tumor is not associated with a cyst, it can usually be removed by coagulating the blood vessels on the periphery of the tumor before the mass is removed. When accompanied by a cyst, as hemangio-endotheliomas frequently are, the cyst is drained, the cavity opened, and the mural nodule is removed with the electrocoagulating needle. Subsequent irradiation is of value in reducing the incidence of recurrence. Many patients are cured. Recently we encountered a case of recurrence of a cystic hemangio-endothelioma 18 years after the original operation. The present lesion was probably not a recurrence but a new lesion which had developed in the same cerebellar lobe.

Metastatic malignant tumors—A recent study of 100 cases of metastatic tumors of the brain from our records by Kiefer,[18] Kernohan and associates[19] revealed that a third originated in the lungs; slightly less than a fourth arose in various segments of the gastrointestinal tract, while about a tenth originated in the breast and a similar number took origin in the kidneys. Kiefer[18] also observed that metastatic lesions were derived from many other sources, but that no more than 3 per cent of the metastatic lesions originated in any one organ. He found that less than a tenth of the metastatic lesions were melanomas. His observations further revealed that multiple metastatic lesions occurred in 70 per cent of his 100 cases and when multiple metastatic lesions were found they were present in the cerebrum in 92 per cent of cases, in the cerebellum in 44 per cent and in the brain stem in 8 per cent.

When metastatic lesions are present they are usually circumscribed and are without a capsule. Their histologic structure is identical to that of the original tumor. Occasionally, carcinomas metastasize only to the meninges and thus give rise to a diffuse meningeal carcinomatosis.

In view of the fact that the metastasis is mul-

TABLE 4

ASTROCYTOMAS OF CEREBRUM: OPERATIONS PRIOR TO 1946*

GRADE OF MALIGNANCY	PATIENTS	AVERAGE AGE, YEARS	AVERAGE PREOPERATIVE DURATION OF SYMPTOMS, MONTHS	AVERAGE POSTOPERATIVE SURVIVAL, MONTHS†	THREE-YEAR SURVIVAL, PER CENT
1	32	33.9	20.8	73.6	62.5
2	38	38.2	11.2	23.8	15.8
3	37	40.4	11.8	11.5	14.3
4	54	42.6	7.3	6.6	3.8
TOTAL	161				

*Cases taken at random for grading of malignancy prior to 1946.[12]

†Since some of the patients were living at the time of this study, these figures represent minimal estimates of average periods of survival after operation.

tiple, little is accomplished by radical surgery. However, in an occasional case symptoms of a localized cerebral lesion appear before symptoms of the primary lesion. Such patients have obtained temporary relief from removal of the metastatic mass. Cerebral decompressions and roentgen therapy offer so little temporary relief that they are rarely indicated.

Gliomas—A surgeon dealing with tumors arising from neural elements, commonly called gliomas, is desirous of determining two facts: (1) the type of tumor present, and (2) the degree of malignancy since his surgical procedure will be governed or modified by the information thus obtained.

Astrocytomas (astrocytomas, grade 1) are slowly growing neoplasms; they are dense, scirrhous, nonencapsulated tumors. They are composed of fairly adult astrocytes with numerous well-formed glial fibrils and a prominent vascular foot or feet.

Polar spongioblastomas (astrocytomas, grade 1) are slowly growing tumors and are uncommon. They are usually moderately well circumscribed and simulate neurofibromas; there is marked interlacing of the fibrils.

Astroblastomas (astrocytomas, grade 2) also are slowly growing neoplasms but are not so benign as astrocytomas, grade 1. The cells are slightly larger than astrocytes; glial fibrils are few and immature and the vascular processes are short and heavy.

Tumors which are designated by the term "glioblastoma multiforme" (astrocytoma, grades 3 and 4) probably are the most malignant of all gliomas. They have multiform characteristics, both grossly and microscopically. Histologically, the tumors usually are characterized by giant cells, mitotic figures and by variation in the size of the various cells and their nuclei. They frequently contain many regions of necrosis or cysts which are the result of occlusion of vessels. Frequently there are vessels with thin walls and marked proliferation of the living endothelial cells; these changes sometimes progress to complete or almost complete occlusion of the lumen of the vessels, hence are responsible for the portions of necrosis found.

Ependymomas (ependymomas, grade 1) are very slowly growing tumors, arising as a rule

TABLE 5

ASTROCYTOMAS OF CEREBELLUM: OPERATIONS PRIOR TO 1946*

GRADE OF MALIGNANCY	PATIENTS	AVERAGE PREOPERATIVE DURATION OF SYMPTOMS, MONTHS	AVERAGE POSTOPERATIVE SURVIVAL, MONTHS
1	109	13.9	78.0
2	14	11.7	74.6
3	8	8.5	84.0
4	0		
TOTAL	131		

*Cases taken at random for grading of malignancy prior to 1946.[11]

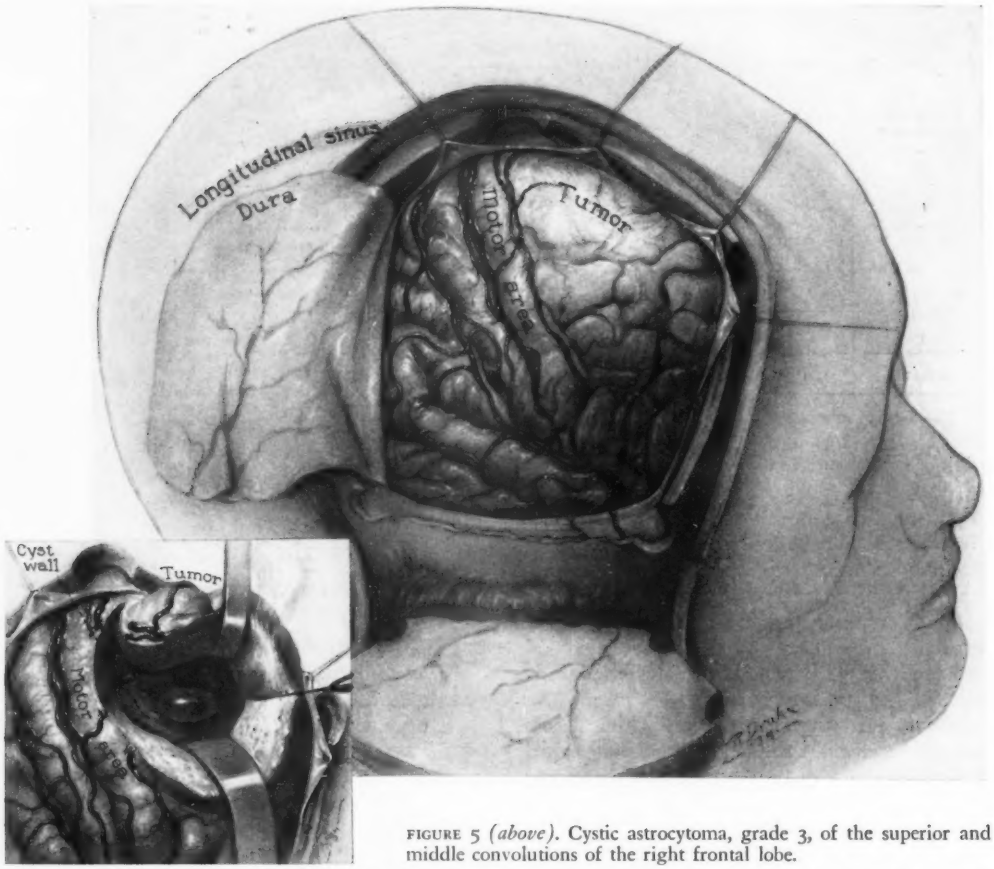

FIGURE 5 *(above)*. Cystic astrocytoma, grade 3, of the superior and middle convolutions of the right frontal lobe.

FIGURE 6 *(inset)*. Exposure of a cystic cavity and removal of mural nodule of tumor with electrosurgical needle; same case as from FIGURE 5.

From: Adson, A. W.: The surgical consideration of brain tumors. **Bull.** School Med. Northwestern Univ. 35:1-42 (Dec. 31) 1934.

from the ependyma of one of the ventricles of the brain or from the central canal of the spinal cord. Sometimes they are circumscribed and appear to have capsules so that they can be enucleated. The histologic picture frequently is complicated, except when the tumor cells tend to form canals similar to the central canal of the spinal cord.

Ependymoblastomas (ependymomas, grades 2, 3 and 4) present a histologic picture in which the characteristic ependymoma structure is less and less clearly defined as the grade of malignancy increases. Variations in size and shape of cells and their nuclei and mitotic figures are present. These tumors parallel the glioblastoma multiforme (astrocytoma, grades 3 and 4) in rapidity of growth.

Oligodendrogliomas (oligodendrogliomas, grade 1) have a tendency to degenerate and to become cystic and often they contain deposits of calcium so that they can be seen on roentgenologic examination. They are characterized histologically by their unusual honeycombed appearance. It is difficult to demonstrate the cytoplasm or the processes of these cells. The nuclei are small and look like lymphocytes surrounded by a hole.

Oligodendroblastomas (oligodendrogliomas, grades 2, 3 and 4) are very malignant neoplasms of the nervous system. They simulate oligodendrogliomas (oligodendrogliomas, grade 1) except that the cells of these tumors are larger than those of oligodendrogliomas; some cellular cytoplasm of oligodendroblastomas can be seen

TABLE 6

EPENDYMOMAS: OPERATIONS PRIOR TO 1946*

GRADE OF MALIGNANCY	PATIENTS	AVERAGE AGE, YEARS	AVERAGE PREOPERATIVE DURATION OF SYMPTOMS, MONTHS	AVERAGE POSTOPERATIVE SURVIVAL, MONTHS†	THREE-YEAR SURVIVAL, PER CENT
1	30	26.1	19.8	77.0	79.3
2	8	28.5	19.6	37.7	28.6
3	9	21.0	9.0	18.2	11.1
4	10	31.3	9.1	10.1	9.1
TOTAL	57				

*Cases taken at random for grading of malignancy.[14]

†Since some of the patients were living at the time of this study, these figures represent minimal estimates of average periods of survival after operation.

and the nuclei of these neoplasms are large.

Ganglioneuromas, gangliocytomas, gangliogliomas or neurocytomas (neuro-astrocytomas, grade 1) are rare. They are characterized by the presence of well-formed nerve cells which contain Nissl bodies, a large vesicular nucleus and a prominent nucleolus. They have an affinity for silver nitrate, which is used to demonstrate the process.

The neuroblastomas (neuro-astrocytomas, grades 2, 3 and 4) are rare neoplasms of the central nervous system. The cells are characterized by large, prominent vesicular nuclei and little cytoplasm. Malignant changes in the astrocytes in the area are commonly seen.

Medulloblastomas usually are found in the midline of the cerebellum of children. They are malignant neoplasms and tend to implant themselves in the ventricles or meninges. In spite of the high degree of malignancy of these tumors, mitotic figures are rare. Microscopically, the tumor cells have oat-shaped nuclei and a small amount of cytoplasm which tends to taper at one end. The cells grow as small segments of large circles.

In all reported series of brain tumors, the evidence of medullo-epitheliomas has been exceedingly low and in many series no tumor of this type has been found. At the Mayo Clinic, those tumors which were classified as medullo-epitheliomas were critically restudied, and it was found that they were either ependymomas, grade 4, or medulloblastomas; therefore, we have eliminated this tumor entity from the classification of gliomas.

Surgical management of the gliomatous group of tumors—Surgical management varies with the position of the tumor and the degree of malignancy present. It is obvious that tumors that arise within the basal nuclei, brain stem, pons and medulla are inaccessible and inoperable. The same may be said for those that arise in the motor cortex or speech centers. However, if they arise in the frontal (Figures 5 and 6), temporal, occipital, vermis and cerebellar lobes, radical resection of the lobe involved is frequently justifiable if there is assurance that all of the tumor mass can be removed thereby. Occasionally, subtotal resection of the lobe is justifiable in order to relieve the intracranial pressure and make it possible to close the bone flap without producing pressure on the edematous brain. When a gliomatous tumor with a cystic cavity is encountered, it is usually wise to evacuate the cyst, open the cavity and remove the mural nodule or as much of the tumor as possible from within the cavity without extending the resection into the vital centers. In this way, increase in the neurologic deficit is avoided. At least the surgeon is not justified in increasing the palsies when it is impossible to remove all of the tumor (Tables 4 and 5).

The ependymomas differ from the astrocytomas in that they are reasonably well circumscribed. Those that have pedunculated attachments to the ependyma often can be removed completely. Since ependymal tumors grow slowly, a radical resection, though the

tumor is not completely removed, will result in relief of symptoms for many years (Table 6).

The neuro-astrocytoma, grade 4, and medulloblastoma are so diffuse and infiltrating that it is almost impossible to effect radical removal. Some neurosurgeons have doubt as to whether any attempt at resection is justified. Occasionally, a wide subtemporal decompression will give temporary relief of pressure and amelioration of symptoms.

Irradiation of these two groups, astrocytoma, grade 4 (glioblastoma multiforme) and medulloblastoma, occasionally is effective in shrinking the size of the tumors and in retarding their growth. This is especially so when the medulloblastomas occur in children.

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DAS NARRENSCHNEIDEN by Pieter Brueghel (1556)

The Obstetric Significance of the Posterior Occiput Position

JOHN L. McKELVEY AND EUGENE J. DIEFENBACH*

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL, MINNEAPOLIS

The occiput posterior position has been considered a serious complication of labor. Evidence is presented that it is a normal, frequently occurring position and that the outlook for mother and child is normal. Difficulties arise with the occiput posterior mainly at midpelvis. Indications for midpelvic study, their recognition and their interpretation are discussed.

It would seem fair to say that at present there is general agreement among students of the problem of the occiput posterior position insofar as most of the practical aspects are concerned. It is a normal, frequently occurring position and radical interference with it is no longer justified. With competent handling of the occiput posterior, the safety of mother and baby is quite comparable to that obtained with other positions. Why is it, then, that the fear of this position remains? Why have all sorts of radical attacks been recommended in the past? There has been progress in our understanding of the details of the problem but there has also been a lag in the acceptance of this information for application by the practitioner. This is the only excuse for discussing the problem now.

An attempt will be made to demonstrate that the occiput posterior is of very frequent occurrence and that the vast majority of these are either unrecognized as primary posteriors or else rotate spontaneously. There is no necessity for serious interference and results comparable to those of the anterior positions can be obtained. The difficulties which sometimes arise are not usually due to the posterior position but to unwise and premature interference, bony pelvic abnormality or both.

*Department of Obstetrics and Gynecology, University of Minnesota Medical School, Minneapolis, Minnesota.

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There are a variety of statements in the literature as to the frequency with which the fetal head primarily engages with the occiput posterior. The differences have no relation to reality but reflect the amount of detailed attention which has been given to accurate early diagnosis. Under ordinary circumstances, most primary posteriors escape attention and rotate early in labor; hence, the higher figures may be accepted. The excellent detailed studies by Calkins[1] have shown that the occiput posterior and anterior primary positions occur with approximately equal frequency. This has been confirmed by others who have used x-ray technics. There can be little doubt that this is true and it is important that it be accepted. At least 9 out of 10 fetuses engaging in the primary posterior position undergo internal rotation to the anterior position. Since only a small proportion of total labors results in any deviation from routine because of the posterior position, it must be clear that the primary posterior position is not in itself a serious abnormality. One must look for special circumstances to explain difficulties.

Calkins[1] has shown that labor which is complicated only by a posterior position is of normal duration. The second stage is prolonged by about 15 minutes and this may be charged to the extra work required to accomplish internal rotation when the posterior has persisted to this time. Primary uterine inertia is somewhat more

JOHN L. McKELVEY

commonly encountered with the posterior position and in many of these instances it is associated with what is known as the dystocia dystrophy syndrome which includes android changes in the bony pelvis, which apparently give rise to the posterior position as well.

A series of 50 consecutive occiput posterior positions from the records of the University of Minnesota Medical School was studied for the purposes of this presentation. In this group were 5 prolonged labors of more than 30 hours' duration. Four were due to primary uterine inertia and one to secondary uterine inertia. The remainder of the labors were well within normal limits. No prolonged labor was due to the posterior position. Only 5 patients or 10 per cent had second stages of more than two hours. Two of these were due to primary uterine inertia. Two others were persistent posteriors and were delivered by simple forceps as posteriors. The fifth patient took 125 minutes to rotate and spontaneously deliver a 2100 gm. baby.

There is no question that difficulties arise during labor in the presence of an occiput posterior position. It was suggested before that there is reason to look for some special feature other than the posterior position alone to explain this. It should be said at once that better accommodation between fetal head and the mother's bony pelvis and soft tissue is achieved with the occiput anterior. It is axiomatic that during labor the form of the head is accommodated to the form of the bony pelvis and soft tissue. The fact that the vast majority of primary posteriors rotate to the anterior position is evidence enough that the anterior position achieves better accommodation. But the difference is slight as manifested by the obvious fact that a normal sized baby will pass normally through a normal sized pelvis as a persistent posterior in the majority of instances. In the series studied, 17 of the 50 babies were delivered as persistent posteriors and only 2 were rotated by forceps. The two rotations were done at the outlet because of the ease with which the conversion could be effected and not from necessity. Two others were manually rotated and delivered spontaneously as occiput anteriors.

WHERE and under what circumstances does the difficulty arise? At the outlet of the pelvis, resistant soft tissue can hold a persistent posterior for sufficient time to endanger the baby. This is, however, readily overcome and will be covered in this discussion. Gross pelvic abnormality at the inlet of the pelvis may interfere but these are almost always anteroposterior contractions and can be recognized and assessed by simple clinical means. The same general standards apply for the therapy of posterior and anterior positions. The real difficulties arise in midpelvis as all who are familiar with the problem know.

As more is learned about the obstetric pelvis, it becomes more evident that most of the midpelvic difficulties of the descending occiput posterior may be ascribed to bony abnormalities. The anterior occiput position may produce difficulties at the same level but it is believed that the occiput posterior presents a more difficult problem in midpelvis for a given degree and type of contraction and a given fetal head size. Partial rotation to the transverse with cessation of progress at midpelvis is the situation which seems to have given the occiput posterior its bad name.

There are two ways to approach this problem. The ideal solution is prophylaxis which involves the recognition of the midpelvic abnormality before labor begins. One would like to stress this as the most important single feature of the whole problem of the occiput posterior. If the bony pelvis is normal and the fetus of

reasonable size, by far the larger part of the occiput posterior problem vanishes. If an unrecognized midpelvic contraction is present, very serious difficulties may arise and will make themselves evident late in labor when no ideal solution is available. For this and many other reasons, careful examination of the midpelvis is an essential part of the first prenatal examination that is done.

What does one look for in midpelvis? A funnel pelvis may be small enough to produce difficulty in midpelvis. When this is associated with an abnormal hind pelvis as may be seen in the android pelvis, serious midpelvic difficulty with an occiput posterior may arise. An abnormally small diameter between the ischial spines may produce difficulty in itself. Loss of vertical concavity of the sacrum alone can interfere but when such loss of hind pelvic space is combined with convergent side walls or abnormal protuberance of the ischial spines, severe interference with descent of the head of a normal sized child may result in any position. This difficulty is increased in the presence of the aftercoming head of a breech, a persistent posterior position or a large fetus even with the occiput anterior.

Under most circumstances midpelvic contraction may be suspected or recognized by clinical means, but its degree and the interrelations of abnormalities in various planes are best obtained by means of accurate x-ray pelvimetry.

What are the indications for such study of the midpelvis? A history of previous obstetric difficulty at midpelvis should always be investigated unless a ready explanation involving something other than the bony pelvis is at hand. The funnel pelvis is very seldom a cause of serious dystocia at the outlet but the transverse contraction which it represents may be a serious abnormality at a higher level. On internal pelvic examination one can get the impression of convergence of the side walls of the bony pelvis. Abnormal prominence or protuberance of the ischial spines may occur alone or in combination with convergent side walls. These are normally separated by 10.5 cm. The low limit for the safe passage of a fetus of less than 3500 gm. is about 9 cm. This assumes a normal vertical concavity of the sacrum to give adequate hind pelvic space at this level. It is best to have 9.5 cm. where any loss of sacral concavity is present. These are safe limits for the occiput anterior. A normal-sized child in occiput posterior will be expected to pass the pelvis under these circumstances but must not be expected to rotate or to be rotated at midpelvic level at these lower limits. These conclusions assume normal flexion of the head, reasonably efficient uterine function and normal maternal soft tissue. They are admittedly arbitrary standards but have proved to be generally useful.

Recognition of the small android pelvis is of importance. The patient who is short and stout with thick short neck, short extremities and short fingers and who has abnormal quantities of body hair with a tendency to male distribution should be suspected of harboring an android pelvis. It is this group which so frequently combines a primary uterine inertia and occiput posterior positions which have difficulty in rotating. This has been described as the dystocia dystrophy syndrome. It is well to explore the midpelvis with accurate x-ray pelvimetry in all of these patients.

The anthropoid pelvis is long in the anteroposterior diameter and more or less contracted transversely. These usually appear in large persons and are usually good obstetric pelves. Not unusually, the head presents in the anteroposterior diameter on engagement as either a direct occiput anterior or direct occiput posterior, to persist in this same position to delivery. In small anthropoid pelves there is sufficient transverse contraction to contraindicate attempts at artificial rotation.

It must be stressed that the bony pelvis is not the only factor concerned in the passage of the fetal head through the maternal pelvis. It would, however, seem to be self-evident that the more one knows about the bony pelvis with which he is to deal, the better he is prepared to make necessary decisions. There is no other method of getting accurate information about the midpelvis than that of x-ray pelvimetry. Simple flat plates are of little use and are likely to be misleading.

There are a number of accurate methods available. This department prefers the stereoscopic method described by Dipple and Hodges. It allows the use of ordinarily available x-ray machines, uses a mathematical check of the accuracy and correction of the common source of error, the tube shift distance, and will turn out very accurate measurements; however, because

it is time consuming it is not for routine application. Clinical indications must be present to justify its use, but when such study is indicated, accuracy is essential. As in most circumstances, one pays for accuracy by effort.

It is the authors' experience that such controls will indicate those pelves which are too dangerous to allow normal delivery of a fetus. Those pelves which are classed as normal will allow safe and usually simple delivery of a normal-sized fetus in occiput posterior position. In the 50 cases studied, there was only one midforceps application. Occiput posterior position had been diagnosed by rectal examination but had spontaneously rotated to L.O.A. after 135 minutes of second stage. This primipara was delivered by an uncomplicated midforceps because of lack of progress. The fetus was normal and weighed 3900 gm. In the series, there was no midpelvic block of a persistent posterior or transverse position.

One may, then, conclude that the occiput posterior is a normal position. The maternal pelvis and soft tissue recognize it as less desirable than the occiput anterior and are remarkably efficient in converting it to the latter. When it persists, there is likely to be a good reason and one should not make arbitrary attempts to change it. Any interference before the cervix is fully dilated is almost certain to be ill advised. A detailed knowledge of the bony pelvis is an essential part of modern prenatal care. Obvious therapy of abnormalities before labor begins will avoid at least the vast majority of the difficulties previously ascribed to the posterior position. The avoidance of premature interference will prevent most subsequent difficulties.

A word should be said concerning the desirability of artificial rotation of the persistent posterior when it has reached the pelvic floor. Many will rotate spontaneously at this level, often after crowning has taken place. Somewhat larger diameters are presented to the soft tissue of the outlet by the persistent posterior. Certainly there is no necessity for rotation to the anterior. Of the 50 patients studied, 17 were delivered as persistent posteriors. There was only one maternal complication and this was a partial third degree tear which was easily and satisfactorily repaired. Under some circumstances of abnormal bony pelvic form, it is most undesirable to rotate the fetal head since accommodation occurs best, as in the presence of transverse contractions, in the position which the head has assumed.

THE rule of the clinic at the University of Minnesota may be very quickly stated. Occiput posteriors are left alone unless a specific indication for interference presents itself. The usual indication is lack of progress with the head at the outlet. If the head can be easily rotated with the hand, this is done and the patient is given a further opportunity to deliver spontaneously. If it can be gently rotated with only the fingers of one hand on the forceps, this is done. If any resistance to rotation is encountered, delivery is carried out as a posterior and usually after deep episiotomy.

And what of the fetus? Cosgrove[2] and Calkins[1] have shown that with careful handling, there is no significant increase in the risk to the fetus from occiput posterior position. All of the 50 babies in the present study were discharged alive and well. There was one moderate asphyxia in a 3180 gm. baby of a primiparous mother. The occiput posterior had rotated spontaneously to an anterior and the child was delivered spontaneously after a 76-minute second stage. There was 1 mild asphyxia and 1 very mild asphyxia encountered in babies with persistent occiput posteriors both of whom were delivered by low forceps as posteriors. It would seem, then, that there is no evidence from the point of view of the fetus that occiput posterior is an abnormal position.

Let us conclude then that occiput posterior position is normal for the mother and baby. Let us make it normal, at long last, for the obstetrician. But let us remember that it is peculiarly prone to produce nasty and often destructive situations, when combined with unrecognized midpelvic contractions or as a result of ill advised and premature interference. As with all potential dystocia problems, there is no better advice than that which urges avoidance of the excessive sized fetus, knowing the bony pelvis in detail and avoidance of interference without a real indication.

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Sympathectomy in the Treatment of Buerger's Disease

LOUIS T. PALUMBO*

VETERANS ADMINISTRATION CENTER, DES MOINES

In the past several years many encouraging reports have appeared in the literature concerning the immediate favorable results following sympathectomy in thromboangiitis obliterans.[1-3, 6, 8-12] These results were based on the release of vasospasm in the diseased vessel and particularly in the collateral vascular bed, thereby creating and improving the circulation to the extremity and digits. This release of vasospasm, which results from pain and irritation from the disease process in the vessel, has resulted in early relief of symptoms, early healing of chronic ulcers, and rapid rehabilitation of the patient.[2, 6, 11] In some cases the sympathectomy may delay a major amputation for many years.[5]

This report is concerned with an evaluation of 20 patients with Buerger's disease treated by dorsal or lumbar sympathectomy.

In this group of cases the indication for sympathectomy was based upon the presence of vasoconstriction. This evidence can be demonstrated by the use of lumbar or dorsal, as the case may be, procaine hydrochloride paravertebral block of the sympathetics. The abolishment of vasospasm of the collateral vascular bed usually results in considerable warming up of the involved extremity, cessation of sweating, and a definite statement from the patient that the extremity feels warm and that he has been relieved of his resting pain or that a definite improvement in his symptoms has occurred and he is able to walk greater distances with little or no discomfort. In many cases pre- and post-paravertebral block temperature readings were recorded by the skin thermocouple. The rise in temperature in many instances following injection was from 4 to 12 degrees Fahrenheit. It has been found that the symptomatic improvement the patient experiences following a response to a paravertebral block and the manual detection of the increase in the temperature of the skin by the examiner following such an injection are sufficient satisfactory evidence that a vasospastic element is present and that favorable improvement can be expected after sympathectomy.

This presentation is not intended to intimate that sympathectomy modifies the course of the disease per se or the pathologic changes already present in the vessels, but the sympathectomy releases the vasospastic element and thereby increases the circulation and also permits a more adequate development of the collateral vascular bed to such a degree as to bring about definite improvement in the circulation of the involved extremity. These collateral channels of the smaller vessels have an elastic potentiality greater than is realized. Marked vasospasm of these channels as a result of pain, irritation of the sympathetic fibers of the diseased vessels, and resultant ischemia produce a vicious cycle which contributes to progressive diminishing of the rate and amount of the blood flow through the vascular bed and particularly the capillary network. This reduction in rate of flow and

*From the Department of Surgery, Veterans Administration Hospital, Des Moines, Iowa.

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FIGURE 1. Posterior view reveals absent sweating (light areas) of buttocks, thighs, legs, and plantar surfaces of feet.

FIGURE 2. Anterior view reveals absent sweating (light areas) of both legs and dorsa of the feet.

quantity of blood passing through will bring about a progressive slowing of the flow in the proximal and larger vessels. The narrowing of the vascular bed and the resultant slower flow of blood will result in sludge formation and a tendency to local thrombosis and occlusion of many of the channels.

These physiologic changes reduce the nourishment and oxygen supply to the local tissues to various degrees resulting in changes and symptoms characteristic of the disease, namely resting pains, intermittent claudication, burning of the feet and calves, coldness and discoloration of the extremities, and excessive sweating of the toes, feet, and legs.

This intricate vascular bed is very sensitive to any changes which may be mediated by external, internal, or local means, whether they are chemical, mechanical, toxic, or emotional. One would be more appreciative of the sudden reversible and irreversible changes which occur in the capillary bed and adjoining larger vessels if one had the opportunity of directly seeing this vascular pattern at work through the visual window which has been used in many experiments in the rabbit. The work of Ebert, Ahern, and Bloch[4] of the University of Chicago, on the pathogenesis of tuberculosis is outstanding in this field and reference to it is strongly recommended.

RESULTS OF RECENT REPORTS IN THE LITERATURE

In 1944 de Takats[2] discussed the value of sympathectomy in the treatment of Buerger's disease in 50 patients. Thirty-seven were able to resume full-time work, 7 returned to part-time work, and 6 remained invalids. He felt that sympathectomy would be of value in those cases in which preoperative tests reveal the presence of sufficient collateral vascular supply. In 1943 Shumacker[13] reported the treatment of 17 cases of Buerger's disease. He, too, stressed the importance of preoperative selection of cases,

FIGURE 3. Posterior view reveals absent sweating (light areas) of upper back, shoulders, entire upper extremities, and dorsa of hands.

FIGURE 4. Anterior view reveals absent sweating (light areas) of upper aspect of chest, shoulders, entire upper extremities, and palmar surfaces of the hands.

particularly those demonstrating significant vascular spasm. In 1947 Freeman[6] observed good results following sympathectomy in 34 cases. Of his series 31 improved, although 5 required minor amputations; 3 failed to improve, 2 of these requiring amputations. Grimson[7] stated that sympathectomy may help patients with thromboangiitis obliterans, believing that such benefits may be largely related to an increase in temperature of the extremity, slight improvement of circulation, and to elimination of the constant fluctuation of tone ordinarily induced by vasomotor nerves.

In 1948, La Tona and Le Fevre[9] reported the treatment of 8 cases. Five received definite benefit and returned to normal activities, 2 were not influenced, and in 1 case the disease process was apparently slowed but a minor amputation was still necessary. They felt sympathectomy was one of the most effective methods of treatment in Buerger's disease. In 1949, Messienger, Goodman, and White[11] reported their results in 19 cases of Buerger's disease. They were of the opinion that sympathectomy in properly selected cases causes early relief of symptoms as well as rapid rehabilitation of the patient with no deleterious effects noted.

In 1948 Cooper and Harris,[1] reporting on their series of 186 operations upon 113 patients with Buerger's disease, believed that sympathectomy is the treatment of choice in thromboangiitis obliterans. Manoil[10] in 1949 stated that by the combined methods of medical management and sympathectomy the incidence of loss of limbs had been reduced to less than 10 per cent. Amputation when necessary can be carried out below the knee in over 80 per cent of cases.

SURGICAL PROCEDURES

LUMBAR sympathectomies, either single or bilateral (at the same time), are usually performed under spinal anesthesia using a transverse abdominal incision on either or both sides

TABLE 1

AGES OF PATIENTS AT TIME OF SURGERY

Years	*Percentage*
20-25	15
26-30	0
31-35	10
36-40	25
41-45*	20
46 and over*	30

*In these age groups the disease and the patients' complaints had persisted for many years; in many instances the diagnosis had not been established prior to this study.

TABLE 2

EXTREMITIES INVOLVED

	Percentage
Both lower	55
One lower	35
Both lowers, one upper	5
Both upper and lowers	5

at the level of the umbilicus. The approach is extraperitoneal through a muscle-splitting incision. The sympathetic ganglionated chain is usually removed from below the first ganglion to below the fourth. There is a variety of patterns in the formation of the chain and a variation in the number of ganglia. The wound is closed in layers using silk sutures throughout. The patient is ambulated on the first postoperative day. The typical sympathetic denervation is shown in the sweating tests pictured in Figures 1 and 2.

Dorsal sympathectomies for the upper extremity are performed under intratracheal anesthesia. A modified Smithwick operation is accomplished by resecting paravertebrally the third rib. The second and third intercostal nerves with the corresponding anterior and posterior roots are removed intradurally, rami transected and the sympathetic chain sectioned below the third ganglion. A silk wound closure is accomplished and the patient is ambulated on the first postoperative day. Typical sympathetic denervation is shown in the sweating tests in Figures 3 and 4.

SUMMARY

THE diagnosis of Buerger's disease, thromboangiitis obliterans, was made in 27, or 0.24 per cent, of 10,903 patients admitted to and treated by the surgical service of this hospital during a three-year period beginning in 1946. Of this total number, 20, or 74 per cent, were treated by dorsal or lumbar sympathectomy, or both. The remaining 26 per cent of the cases refused sympathectomy. Intermittent claudication was the initial symptom in 75 per cent of the cases. The remaining 25 per cent of cases complained of cold clammy toes and feet or ulceration of toes which failed to heal, or both, or initial gangrene of the toe or toes. In this group a small number had a history of recurrent attacks of thrombophlebitis. The average duration of symptoms before admission was 35.1 months. All the patients were men and none were Jewish. There were no Negro patients in this group. The age groups of the patients treated are listed in Table 1. The lower extremities were involved more frequently than the upper (Table 2). All patients, except 2, smoked cigarettes averaging over one package per day. The 2 patients never smoked. Twenty per cent of this group smoked at least 2 packages of cigarettes daily for many years.

The patients who had ulceration and gangrene of the toes prior to sympathectomy were both heavy smokers, smoking 1½ to 2 packages of cigarettes daily, and refused to stop smoking during or after treatment. Both cases were unimproved symptomatically following sympathectomy, but failure on their part for full cooperation in the treatment outlined, coupled with progression of their disease, resulted in the necessity for amputation. In one case a midthigh amputation was performed seven and one-half months following sympathectomy and in the other case a below-the-knee amputation was accomplished seven months following sympathetic denervation. Both stumps healed.

No previously viable digit became gangrenous in this group. In those patients with no gangrene, there was an increase in the walking distance without pain. The patients greatly appreciated the loss of the cold clamminess of the extremity, the increased warmth, and increased tolerance to cold.

The typical areas of denervation in this series of cases, both of the lower and upper extremities, are typified in the patient who had a bilateral dorsal and lumbar sympathectomy (Figures 1 to 4).

CONCLUSIONS

1. A summary of the results obtained in the treatment of Buerger's disease—thromboangiitis obliterans—by dorsal or lumbar sympathectomy, or both, in 20 patients, upon whom 33 operations were performed, is presented.

TABLE 3
DORSAL AND LUMBAR SYMPATHECTOMIES

	NUMBER OF PATIENTS OPERATED			NUMBER OF OPERATIONS
	Unilateral	*Bilateral*	*Total*	
Lumbar	7	12	19	30
Dorsal	1	1	1	3
TOTAL	8	13	20*	33

*Quadrilateral sympathectomy, one patient.

TABLE 4
POSTOPERATIVE RESULTS

Total number of patients 20

	Number	*Per Cent*
Total with gangrene or ulceration	8	40
Healed without amputation	5	62.5
Healed with minor amputations	1	12.5
Major amputations—gangrene failed to heal and progressed after sympathectomy (both cases failed to stop smoking)	2	25.0

2. Sympathectomy in properly selected cases of Buerger's disease, showing a vasospastic element to the vessels of the vascular bed, results in early relief of symptoms, rapid healing of ulcers, and early rehabilitation of the patient as noted in the one to three-year follow-up and re-evaluation.

3. Sympathetic denervation in early cases may prevent or delay the need for a major amputation which in the majority of cases, when it becomes necessary, can be carried out below the knee.

Twenty patients were treated by sympathectomy, a total of 33 operations, of which 12 were bilateral and 7 were unilateral lumbar sympathectomies; one unilateral and one bilateral dorsal sympathectomy (this case also had bilateral lumbar sympathectomy) (Table 3 and Figures 1 to 4) were performed.

There was immediate relief of severe pain of aching and burning character in the foot and frequently including the entire leg to above the knee. In those patients in whom gangrene of the toe or toes and ulcer were present, the pain was less severe but was usually localized at the site of involvement. In 6 cases in which infection and ulceration were present, 5 healed rapidly and completely; the sixth case required amputation of a gangrenous small toe (Table 4).

Addendum: The results of a follow-up study in this series for two to four years remain the same as presented.

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AUTHOR'S CORRECTION

Postgraduate Medicine has been asked to correct the sentence beginning on the eighth line, left column, page 6, of the article, "The Clinical Use of Histamine," (January, 1951) as follows: "One cubic centimeter of 0.275 per cent solution of histamine diphosphate is added to 500 cc. of isotonic solution of sodium chloride."

CLINICAL STUDY

Treatment of Vaginitis and Cervicitis by the General Practitioner

KARL JOHN KARNAKY*

JEFFERSON DAVIS HOSPITAL, HOUSTON

The evaluation of new drugs for the treatment of vaginitis and cervicitis continues to be of interest to the leukorrhea research clinic, the gynecologist and to the general practitioner in spite of the large number of preparations available and the generally favorable results obtained with those recently developed. One may have a favorite method of treatment for vaginal infections of bacterial and/or protozoal origin which clears up most of these without difficulty. However, there is the occasional patient who does not respond to this therapy and for whom another method should be tried. It is well known that vaginal infections which sometimes fail to respond to one form of treatment will respond when another form is administered.

Siegler[1] recently reported the use of sulfathiazole acid jelly in a new base as a new preparation in the treatment of vaginitis and cervicitis. Stein and Kaye[2] described its beneficial use in the treatment of the abnormal cervix. This method of treatment and the results obtained intrigued us because of the pharmaceutical rationale behind the product and because of the apparent convenience of the described single-dose applicators both for office and home use, and also because the writer was first to report the use of acids in the treatment of vaginal and cervical infections. The purpose of this paper, therefore, is to report on clinical studies of this preparation pursued during the last two years.

RATIONALE FOR TREATMENT

The work of Cruickshank and Sharman[3] in England and Rakoff[4] and Karnaky[5] in America, on hydrogen ion concentration (*p*H), glycogen contents of vaginal mucosa, and the bacterial flora, has placed modern treatment of vaginal infections on a much sounder physiologic basis. These studies have influenced the formulation of vaginal medications so that they fulfill the following objectives:

1. Simplicity and convenience in use, by the physician in the office and the patient at home.
2. Solubility in the vaginal secretions for maximum contact of medication with vaginal and cervical mucosa.
3. Buffered effectively so as to acidify vaginal secretions to the physiologic *p*H (4.0 to 5.0).
4. Good antiseptic properties against the primary infective organisms as well as against the secondary infestations.
5. Freedom from irritation and toxicity.

MEDICATION INVESTIGATED

The sulfathiazole acid jelly* used in this study has the following formula:

Sulfathiazole	10.0 per cent
Lactic acid	3.0 per cent
Acetic acid	1.0 per cent
TERGITOL	0.1 per cent
Polyethylene glycol (CARBOWAX)	85.9 per cent

The jelly has good wetting properties, is very soluble in the vaginal secretions and is buffered so that it acidifies these secretions to the physiologic vaginal *p*H (4.0 to 5.0) over long periods of time following each application when one application is inserted night and morning. The lowered *p*H is in itself an effective means of controlling pathogenic organisms. This was reported by the author years ago. The jelly is sterile and has the added antibacterial action of the sulfathiazole which it contains in solution.

METHOD OF APPLICATION

The jelly is packaged in unique, ready-to-use applicators, each carrying a measured single dose.

*From the Gynecological Clinic, Research Division, Jefferson Davis Hospital, Houston, Texas.

*WESTHIAZOLE, Westwood Pharmaceuticals, Buffalo, N. Y.

The applicator has been described and illustrated by Siegler.[1] It consists of a disposable cardboard syringe-like cartridge which makes the application of a dose as easy and convenient for the patient at home as for the physician at his office. We believe these applicators most nearly fulfill the therapeutic objective as set forth by the Council on Pharmacy and Chemistry of the American Medical Association[6] in its discussion of antitrichomonal agents, "thoroughness and persistence with the simplest and least messy procedures."

TOXICITY OF SULFATHIAZOLE ACID JELLY

The local application of sulfonamide preparations has been recently condemned because of the possibility of inducing sensitivity reactions. A review of the literature on such use intravaginally, however, fails to reveal the necessity for as much concern as has been expressed by dermatologists. Parks[7] used sulfanilamide ointment on 68 patients and Angelucci[8] on 100 patients. Roblee[9] reported his experience with a sulfathiazole acid jelly on 183 patients and Findley[10] used a sulfanilamide acid jelly. No untoward effects were observed in any of these cases.

Siegler[1] observed 2 cases of mild reactions, possibly attributable to local sulfathiazole sensitivity, out of a total of 382 patients using Westhiazole. This safety record is significant when one considers that some of his patients received two applications daily for periods longer than 15 weeks. Stein and Kaye[2] did not observe sensitivity reactions in any of the cases they reported.

We have repeatedly done many complete blood counts, sedimentation rates, urinalyses, blood cholesterols, uric acid and fasting glucose tolerance determinations on patients who received three or four applications a day for six weeks, without noting any abnormal changes in the test results.

The results of such studies on 2 patients are described in Table 1.

We did not observe any patient who absorbed enough sulfathiazole to produce a generalized rash. However, 6 patients developed mild, local reactions in the vaginal mucosa. These were of minimal consequence and disappeared immediately after discontinuing sulfathiazole acid jelly. We can fairly conclude that this sulfathiazole acid jelly is nontoxic when used as advocated in the literature. However, it is well known that when sulfonamides are given one will have an occasional patient who is sensitive to the drugs.

INVESTIGATIONAL DATA

This report includes 317 cases of vaginitis: 169 cases of *Trichomonas vaginalis,* 139 *Monilia albicans* and 9 nonspecific. It also includes 60 cases of cervicitis which were treated electrosurgically as follows: 10 cauterized, 10 coagulated and 40 coned.

KARL J. KARNAKY

In addition to routine case histories the following tests and observations were recorded for each patient before and at intervals during and after treatment with this sulfathiazole acid jelly: (1) complete urinalyses, (2) urine cultures when urinary symptoms were present, (3) hydrogen ion concentration (*p*H) determinations with a Beckman *p*H meter, using special glass electrode—readings were recorded on the posterior and anterior fornices, the cervix, and right and left lateral vaginal walls, (4) fresh, wet smears and Sabouraud's cultures and Gram stains.

Results were also recorded by the generous use of colored photographs and schematic drawings of cervical or vaginal lesions.

Two to four doses of sulfathiazole acid jelly were placed in the vagina in the office and one dose was inserted on retiring. Some patients inserted two doses at bedtime. A cotton plug was placed by the patient at the introitus after each application of sulfathiazole acid jelly. The patient was instructed not to douche at any time during medication with this preparation.

When the jelly was being used postoperatively after coagulation, cauterization or conization, four to six doses were instilled into the vagina immedi-

TABLE 1

AVERAGE BLOOD COUNT, SEDIMENTATION RATE AND BLOOD ANALYSES BEFORE AND DURING TREATMENT WITH SULFATHIAZOLE ACID JELLY

TEST	PATIENT L. S.*		PATIENT G. O.**	
	Before Treatment	*During Treatment*	*Before Treatment*	*During Treatment*
Red blood count	4,003,000	3,780,000	3,614,000	3,657,000
White blood count	8,800	8,100	6,144	5,770
Hemoglobin	71.2 per cent	74.8 per cent	77.4 per cent	73.6 per cent
Sedimentation rate	14 mm.	14 mm.	14 mm.	14 mm.
Basophils	2	2	1	2
Eosinophils	2	2	3	14
Juveniles	2	3		1
Stabs	4	5	5	5
Segments	60	68	66	65
Lymphocytes	29	22	21	27
Monocytes	3	1	3	5
Blood uric acid	1.5 mg.	3 mg.	2.99 mg.	3.06 mg.
Blood glucose	93 mg.	116 mg.	96 mg.	100 mg.

*Patient L. S., white, 43 years of age. Duration of treatment was 26 days. A total of 96 doses was used (720 gm. of sulfathiazole acid jelly), 52 by the patient at home. At each of three office visits, 4 doses were packed into the vagina; at each of four office visits, 8 doses were packed into the vagina.

**Patient G. O., white, 66 years of age. Duration of treatment was 148 days. A total of 296 doses was used by the patient at home.

ately after such electrosurgical procedure and the vagina was packed tight up to the introitus with medium-sized cotton balls. This procedure was repeated twice weekly for three weeks, at each visit to the office.

Cervical ectropions were cauterized, coagulated or coned as soon as possible after the last day of menstruation in order that the treated area would heal by the onset of the next menstrual period.

Criteria for determining cases as corrected were: relief from symptoms, return of the vaginal secretions to a normal and physiologic *p*H, negative smears and cultures taken at intervals during three months following the termination of treatment. Results were classified as well, improved and failures, as determined by visual examination and the criteria already described.

RESULTS

Vaginitis—Table 2 presents the results obtained with this sulfathiazole acid jelly in 169 cases of *T. vaginalis* vaginitis. In 145 cases (86 per cent) the results were good; in 9 cases (5 per cent) the results were fair; and in 15 cases (9 per cent) the results were poor. In recent cases of acute and subacute vaginitis and cervicitis the sulfathiazole acid jelly gave the best results. In resistant or recurring cases the results were not as good. Also summarized in Table 2 are the results obtained in 139 cases of infestations with *M. albicans:* 89 cases (64 per cent) were cured, 25 cases (18 per cent) were improved and 25 cases (18 per cent) were in no way improved. The same table tabulates the results obtained in 9 cases of nonspecific vaginitis. Good results were obtained in 7 cases (78 per cent) and improvement in symptoms was noted in 2 cases (22 per cent).

As these tables indicate, the response to treatment with sulfathiazole acid jelly was best in early acute *T. vaginalis* infestations as well as in nonspecific infections. While 64 per cent of the cases infected with *M. albicans* were considered cured, there were 25 failures (18 per cent). In about 50 per cent of the failures, both in the trichomonal and in the monilial cases, the symptoms had improved but reinfection apparently occurred when the medication was discontinued. *Monilia* is known for its resistance to many vaginal preparations on the market at present.

Itching and burning were controlled within 6 to 24 hours. The reduction in the amount of leukorrhea early in the treatment was difficult to evaluate since during the first two or three days the jelly dissolved in and ran out with the discharges onto the cotton pad or the entire vaginal pack came out. After two or three days, however, the vagina became dry and the leukorrhea was controlled. A mild to moderate astringent effect on the vaginal mucosa was noted, which we consider to be a favorable reaction of this preparation. In a few cases marked astringent reaction occurred which caused acute discomfort at the introitus. In most cases of vaginitis the grade of bacterial flora quickly changed from grades III and II to grade I. The *p*H changed from abnormal values to physiologic acid levels of 3.8 to 4.9. Table 3 illustrates the changes in *p*H observed in the average patient before, during and after treatment with this sulfathiazole acid jelly.

Chronic cervicitis (ectropion)—Nineteen cases of chronic cervicitis (ectropion or so-called erosion of the cervix) were treated, but *no case was cured.*

TABLE 2

RESULTS OF TREATMENT OF VAGINITIS WITH SULFATHIAZOLE ACID JELLY

TYPE OF INFECTION	TOTAL NUMBER	WELL		IMPROVED		FAILURES	
		Number	*Per Cent*	*Number*	*Per Cent*	*Number*	*Per Cent*
Trichomonas vaginalis	169	145	86	9	5	15	9
Monilia albicans	139	89	64	25	18	25	18
Nonspecific	9	7	78	2	22	0	

DURATION OF TREATMENT—WELL PATIENTS*

Weeks	1 or less	1 to 3	3 to 7	7 to 14	18 to 33
Per Cent of Cases	27	40	24	6	3*

*These represented patients given extended treatment after they were well, for purposes of evaluating the toxicity of sulfathiazole.

We have observed time and again that vaginal preparations have been advocated for chronic cervicitis which means, to many physicians, an ectropion of the cervix. *The author has not been able to cure any ectropion of the cervix with any preparation inserted into the vagina by the patient that has been advocated for such purpose during his 16 years' research on this problem.* Monilial, trichomonal and nonspecific infections of the vagina which have extended up and onto the cervical surfaces may be destroyed with sulfathiazole acid jelly, but true ectropions (face of cervix covered with columnar cervical cells) should not be so treated. These are best cauterized, coagulated or coned, and then followed by biweekly vaginal packs with sulfathiazole acid jelly for about three weeks. In most cases of chronic cervicitis studied, the use of this jelly after electrosurgery hastened the period of complete recovery, and prevented much of the discomfort associated with such procedures. In most cases of electrosurgically treated cervicitis there was no slough or a very thin slough formed at the treated area. The treated area remained red, which hastens epithelization and so reduces the time required for healing of the treated area to approximately three to five weeks. This is an improvement over Findley's findings[10] who reported that his post-treated cervicitis cases required over seven weeks for healing.

Acute cervicitis—Twelve cases of acute cervicitis were relieved of their infection by the use of one dose of sulfathiazole acid jelly before bedtime and upon arising, for a period of 12 to 15 days.

Other gynecologic conditions—Sulfathiazole acid jelly was used following irradiation therapy in 17 cases of cancer of the cervix. The product is of value because it controls odor and secondary infections due to its *p*H and sulfathiazole contents. In such conditions two to four doses of this acid jelly are applied daily by the patient.

Seven cases of ulcer of the fourchette, 5 cases of ulcer of the labia, 6 cases of true ulcer of the cervix, 3 post-coagulated verrucae of the perineum and 5 cases of acute gonorrheal cervicitis responded well to the use of this sulfathiazole acid jelly.

DISCUSSION AND SUMMARY

Since we are carrying on extensive continuous research on leukorrhea in order to try to find a better treatment for this condition, and fully realizing that we are far from the ideal preparation, we therefore present a new sulfathiazole polyethylene glycol acid jelly which has been added to our armamentarium for the treatment of *T. vaginalis, M. albicans* and nonspecific infections of the vagina. This jelly is also of value as an adjunct to such procedures as electrosurgery, coagulation, cauterization and conization.

Sulfathiazole acid jelly was used in 169 cases of *T. vaginalis,* 139 cases of *M. albicans,* and 9 cases of nonspecific infections of the vagina. The results obtained with this acid jelly compare favorably with similar preparations described in the literature.

TABLE 3

TYPICAL VAGINAL *p*H BEFORE, DURING AND AFTER TREATMENT WITH SULFATHIAZOLE ACID JELLY
PATIENT A. C., TRICHOMONAS VAGINALIS VAGINITIS

READINGS TAKEN	FORNIX		LATERAL WALL		CERVIX
	Posterior	*Anterior*	*Left*	*Right*	
Before treatment	7.5	6.6	6.1	6.2	7.2
During treatment	6.2	5.8	5.6	5.0	6.8
After treatment	4.5	4.7	5.0	4.3	4.6

TABLE 4

SUMMARY OF VAGINITIS CASES

AGE INCIDENCE		PAROUS STATE		COMPLAINTS		MENSTRUAL HISTORY	
Years	*Per Cent*	*Para*	*Per Cent*	*Symptoms*	*Per Cent*	*Menstruation*	*Per Cent*
4	1	Nulli	48	Leukorrhea	41	Regular	50
10 to 20	4	Primi	24	Headaches	25	Irregular	8
20 to 30	43	Multi	28	Backache	23	Menopause	18
30 to 40	31	Pregnant	5	Itching	47	Dysmenorrhea	32
40 to 50	12	Sterile	6	Burning	19	Pregnancy	5
50 to 60	8			Dyspareunia	7	Menorrhagia	7
60 to 70	1			Bladder symptoms	14	Hypomenorrhea	3
				Nervousness	20	Hypermenorrhea	1
				Irritation	6	Hysterectomy	9
				Bilateral pelvic pains	4	Menometrorrhagia	3
				Contact bleeding	2	Polymenorrhea	1
						Cancer	2
						Radium	2

In cases of chronic cervicitis (ectropion) the jelly was used following cauterization in 10 cases, coagulation in 10 cases and conization in 40 cases.

Sulfathiazole acid jelly was also found to be of value in 38 miscellaneous gynecologic conditions requiring the use of an antiseptic acid jelly.

Sulfathiazole acid jelly comes in a single disposable cartridge. It should be kept stored in a cool place. This is especially important in the warmer climate of the South.

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COMING POSTGRADUATE COURSES

Wayne University College of Medicine, Detroit

Comprehensive unit course in basic ophthalmology, full time, 9 months, at Kresge Eye Institute, beginning in September, 1951. Applications must be made immediately; write Postgraduate Department, 1512 St. Antoine St., Detroit 26, Michigan

Postgraduate course in early detection of cancer, scheduled so that it may be taken for the entire year of three quarters or any one quarter may be selected. First quarter begins September 10 and ends December 1; second quarter begins December 3 and ends March 8, 1952. Registration can be made in the office of Postgraduate Medical Education, 1512 St. Antoine St., Detroit 26, Michigan

American College of Physicians

The following courses have been arranged by the American College of Physicians at the institutions listed:

Diseases due to allergic and immune mechanisms, University of Pittsburgh School of Medicine, Pittsburgh, April 24-28, Dr. Leo H. Criep, director

Some recent developments in the principles and practice of modern internal medicine, Pennsylvania Hospital, Philadelphia, May 7-12, Dr. Garfield G. Duncan, director

Electrocardiography: basic principles and interpretation, Massachusetts General Hospital, Boston, May 14-19, Dr. Conger Williams, director

Dynamic therapeutics of chronic diseases, New York University-Bellevue Medical Center, Institute of Physical Medicine and Rehabilitation, New York, May 21-25, Dr. Howard A. Rusk, director

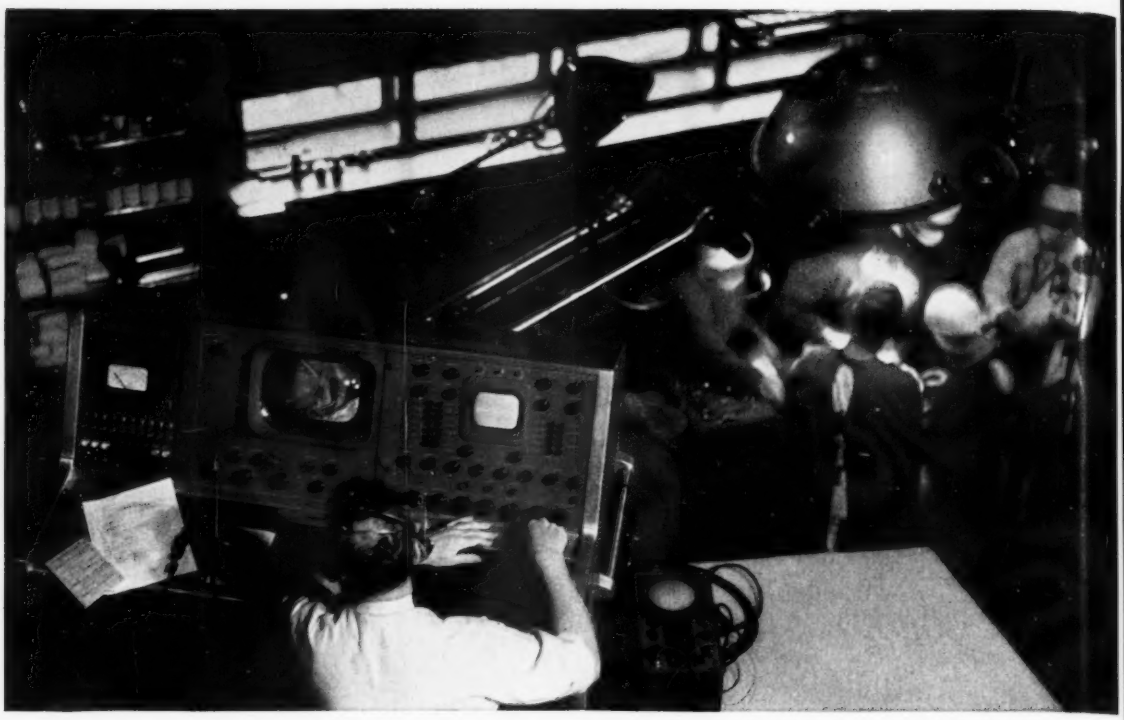
Internal medicine, Boston University School of Medicine and Massachusetts Memorial Hospitals, Boston, June 4-8, Dr. Chester S. Keefer, director

University of Minnesota Medical School, Minneapolis

Continuation course on diseases of the blood in infancy and childhood, at the Center for Continuation Study, April 16-18, under the direction of Drs. Irvine McQuarrie and Charles D. May of the Department of Pediatrics. Visiting lecturers include Dr. William Dameshek, Boston; Clement A. Finch, Seattle, and Robert W. Heinle, Cleveland

Continuation course in urology, at the Center for Continuation Study, April 2-6, under the sponsorship of the North Central Section of the American Urological Association. Dr. C. D. Creevy is faculty chairman. Visiting physicians who will participate include Dr. Hugh J. Jewett, Baltimore; Dr. Lloyd G. Lewis, Washington, D. C.; Dr. Reed M. Nesbit, Ann Arbor, and Dr. Parke G. Smith, Cincinnati

Pharmacy and Medicine pioneer color television



COLOR TELEVISION BRINGS CLINIC TO THE DOCTOR

An extra figure in operating rooms and clinics has become a super-teacher at many medical meetings and seminars. It is the color television camera, and it gives a surgeon's-eye view of the operation—or the physician's-eye view of the clinical demonstration. Graduate doctors and medical students need no longer sit in amphitheaters, many yards away from the patient, and wonder just what tissue the surgeon is cutting, just what lesion the physician is demonstrating. Now, they are scalpel-length away, and can watch not only the surgeon's technic, but see, through the wonder of color, the shadings of a growth he is removing.

The doctors can observe all this on television screens in the comparative comfort of hotel or convention hall rooms, perhaps miles away from the operating room or clinic. Teaching by television has become a medical fact, providing on-the-scene instruction to bring to life the scientific reports that appear in medical journals. The famed surgeon or diagnostician who could heretofore demonstrate his skill to dozens, can now teach thousands, and do the job better with the help of such experts as those from the Smith, Kline & French Laboratories, the organization responsible for the emergence of color TV as a medical teaching aid.

Special technical arrangements are made for every color television demonstration. One or more operating rooms or clinics in the participating hospitals are turned into temporary television studios. The compact control panel and mobile color camera are moved right into the operating room or clinic; special precautions are taken to preserve the strictest aseptic conditions. The camera is moved to within a few feet of the operating table or the clinical patient, so that the camera's lens has as close a view as the surgeon or physician himself.

A small mask microphone lets the surgeon or physician give a running commentary on what he is doing. If he should block the camera, a tiny earphone brings him whispered warnings from the TV coordinator.

The TV signals are monitored at the control desk, sent by cable to the roof of the hospital or clinic, and broadcast by special frequency to the room where the medical meeting is being held. Screens of 15 to 20 special color television receivers bring full-color views of the programs to as many as 1,000 physicians and surgeons at once. The programs are planned by the medical societies, medical schools and hospitals with the help of SKF's Medical Television Unit. They are coordinated by a physician, Dr. Kendall A. Elsom, associate professor of clinical medicine at the University of Pennsylvania, now assisted by Dr. Robert E. White, assistant instructor in medicine.

The history-making system of bringing the clinic to the doctor by color television began with the

(Opposite page) From behind the control desk in St. Luke's Hospital, the monitor screen shows the picture being transmitted to members of the American College of Surgeons in the Stevens Hotel, Chicago.

(Above) Members of the staff of Johns Hopkins Hospital watch a color-televised operation on the screen of a special receiver installed in the hospital during the demonstration for an A.M.A. Clinical Session in Washington.

American Medical Association's meeting in June, 1949. It has been followed by demonstrations at 16 other medical meetings from coast to coast. So far, 435 surgical operations and medical clinics have been transmitted from hospitals to medical meetings; attendance has reached 137,000.

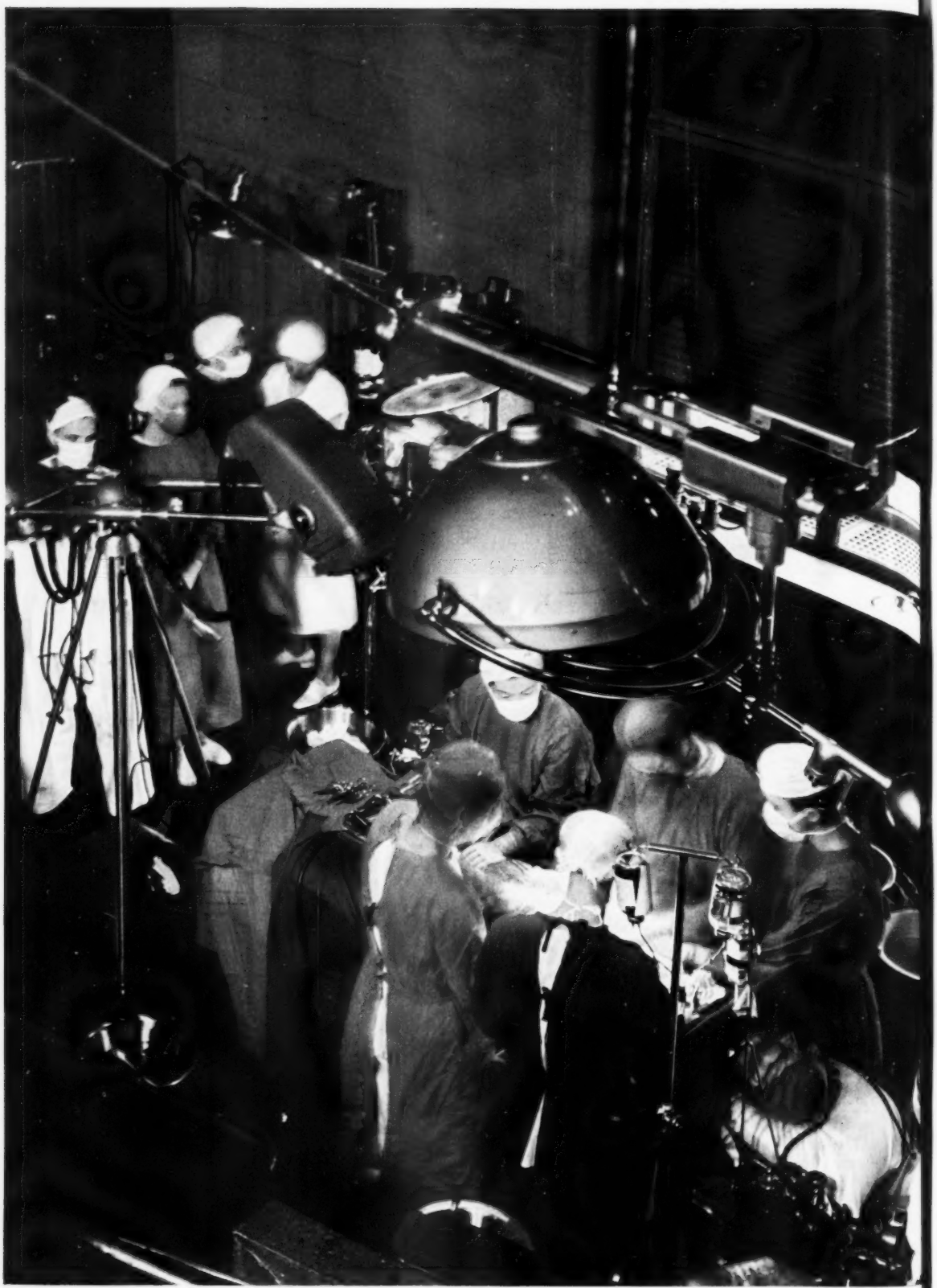
Last fall, medical color television passed a new milestone at a special postgraduate medical teaching seminar held by Wayne University College of Medicine in Detroit. It was the first such seminar ever conducted entirely by color television.

The dean of Wayne University College of Medicine, Dr. Gordon H. Scott, is enthusiastic. He says: "Our experience indicates that the demand for graduate medical education is increasing rather than lessening. . . . It is now clear that we must experiment with technics of mass education. Of these, the new medium of color television seems to offer the most promise." Other teachers and physicians have welcomed this new era in medical education as electronics spreads the precepts of Osler. Dr. William S. Middleton, dean of the University of Wisconsin Medical School and president of the American College of Physicians, calls color TV "an innovation that cannot help but revolutionize medical education." Dr. I. S. Ravdin, professor of surgery at the University of Pennsylvania School of Medicine, says: "Color television is one of the greatest advances ever made in medical teaching."

Dr. Dean Clark, director of Massachusetts General Hospital, summed up, in an interview on the Voice of America, the impact of color TV on medical education. He said: "As a technic, it's a superb one for teaching. One of the problems in any teaching hospital is how you have the medical students, nurses and other groups being taught there see the very things they need to complete their education. It is very difficult, especially in the matter of surgery, because we have always to protect our operating rooms against infection brought in from outside, and therefore cannot let students in very easily. . . . With television, you can have as many as you want and it's perfectly safe."

SPRING SCHEDULE

SKF color television will be shown at the following meetings: American College of Physicians, St. Louis, April 9-12; St. Louis Gynecological Society, April 14; Missouri State Medical Society, Kansas City, April 22-25; Texas State Medical Society, Galveston, May 1-2; Rocky Mountain Medical Conference, Denver, May 13-16; American Medical Association's Annual Session, Atlantic City, June 11-15; Canadian Medical Association's Annual Session (first Canadian appearance of medical color television), Montreal, June 18-21.



Diagnostic Clinic

The Effects of Emphysema of the Lungs on the Cerebral and Coronary Circulation

WILLIAM S. McCANN*

UNIVERSITY OF ROCHESTER, ROCHESTER, NEW YORK

Factors in pulmonary emphysema are discussed, which give rise to impairment of cerebral or coronary circulation. These are (1) increased alveolar air pressure as in paroxysms of coughing, (2) bronchial constriction, (3) pulmonic hypertension and sclerosis, (4) impaired reciprocal pressure changes between abdomen and thorax and (5) increased intracranial pressure and carbon dioxide acidosis induced by oxygen administration.

EMPHYSEMA, by far the commonest abnormality of the lungs, is all too frequently disregarded as a factor in circulatory disturbances, especially in its less obvious forms.

The large lung types of obstructive emphysema are usually given recognition as are those forms associated with extensive pulmonary fibrosis. Of the postural emphysemas only those with pronounced kyphoscoliosis have received the physiologic consideration they deserve. Even in these instances more attention has been paid to the mechanics of ventilation and gas exchange than to the equally important circulatory effects which are inherent in all forms of emphysema. In our clinic in Rochester we have become greatly interested in the ways in which the lungs may act as a "check valve" on the circulation as a whole.[1]

In Figure 1 is shown a crude diagram of the entire circulation in which I would call to your attention the three sets of vascular channels which connect the right heart with the left. Of these, the channel through the pulmonary artery to the pulmonary vein bears the principal traffic from the right ventricle to the left. The other two channels, the bronchial and the coronary, bear blood from the left ventricle to the right.

*Dewey Professor of Medicine, University of Rochester, Rochester, New York.

Presented at the thirty-fifth annual Assembly of the Interstate Postgraduate Medical Association, Chicago, 1950.

It must be obvious, from consideration of this diagram, that the possibility exists that conditions could be set up in the lungs which would so impede the transfer of blood from the right heart to the left as to greatly reduce the output of the left ventricle, producing symptoms of insufficiency of blood flow in the cerebral and coronary circuits, as well as other important effects. These conditions may be described as follows: increase in alveolar air pressure such as would occur in acute bronchiolar spasm, during the Valsalva experiment, and during violent paroxysms of coughing.

If the intra-alveolar pressure is raised enough to exceed the pressure in the network of capillaries covering the alveoli, the flow of blood through them could be stopped. In acute form this occurs in anaphylactic shock and in acute obstructions of the respiration in the larynx or trachea.

In 1876 Charcot described "laryngeal epilepsy" associated with severe paroxysms of coughing. More recently Whitty and Rook have recorded instances of this disorder, and also observed its occurrence in members of the Royal Air Force during the Valsalva test, or while breathing against resistance. In our clinic we were fortunate enough to be able to record the circulatory events taking place in a patient with "tussive syncope," or "laryngeal epilepsy," who had syn-

WILLIAM S. McCANN

cope and convulsions brought on by severe bouts of coughing.[2] In this subject the pressure in the pulmonary artery rose to extraordinary heights (260 mm. of mercury) while at the same time the peripheral (femoral) arterial pressure fell below 50 mm. of mercury and syncope and convulsions occurred. Since then we have observed other instances of this type. In less acute obstructions blood transfer from the right heart to the left might continue at a level compatible with life, but associated with stasis in the afferent half of the circulation and inadequate output of the left ventricle.

Once attention was drawn to the nature of this phenomenon we began to appreciate why patients with chronic emphysema so frequently exhibit cerebral symptoms after bouts of coughing. In the majority of instances syncope does not occur, but lightheadedness, mental confusion and motor ataxia occur frequently during paroxysms of coughing in such patients.

In many patients with chronic emphysema, particularly those who have the frequently associated bronchitis and/or bronchial asthma, one may find such episodes. One must also bear in mind that these effects are not all to be attributed to rising alveolar pressure. The diminished negativity of the intrapleural pressure is important, and in patients who have "pot bellies," the lack of a compensatory rise in intra-abdominal pressure becomes of increasing importance in disturbing the circulation by impairing the venous return, without which adequate cardiac output may not be maintained. Furthermore, we have learned that the pulmonary arterioles are frequently narrowed and thickened by changes quite analogous to those found in systemic hypertension.[3,4] Such anatomic findings may now be explained by recent work which shows that *during anoxia, vasoconstriction occurs in the pulmonary arterial system,* so that the development of such changes might be expected in all cases in which chronic emphysema results in chronic anoxia. The work of von Euler and Liljestrand[5] on cats showed that pulmonary arterial pressure rose during periods of anoxia. This has been confirmed in humans. Dirken and Heemstra[6] showed that the vasoconstriction was produced by the formation of histamine in the lungs and could be inhibited by antihistaminics.

So far we have mentioned only cerebral symptoms of chronic or acute emphysema. I should like to discuss the possible effects on the coronary circulation, which may suffer under those conditions which diminish the adequacy of the left ventricular output. In normal individuals there is a small rhythmic variation in ventricular outputs to which Lauson, Bloomfield and Cournand[7] have called attention. In our clinic Brown[8] has noted the invariable association of large respiratory variations in cardiac output with angina pectoris. In Figure 2 is shown the record of one of these cases, in which the amplitude of the ballistocardiogram is markedly diminished during expiration, and the improvement which resulted when abdominal pressure was increased by an appropriate belt. This work supports the views of Kerr[9] who was frequently able to relieve both cerebral and cardiac symptoms of patients with postural emphysema by fitting them with abdominal supports, correcting posture and reducing weight.

Our consideration of this problem must not be limited to purely mechanical lines. It is characteristic of pulmonary emphysema to find an elevation of the carbon dioxide combining power of the blood, undoubtedly in compensation for retention of carbon dioxide. In England, Simpson[10] has called attention to the high intra-

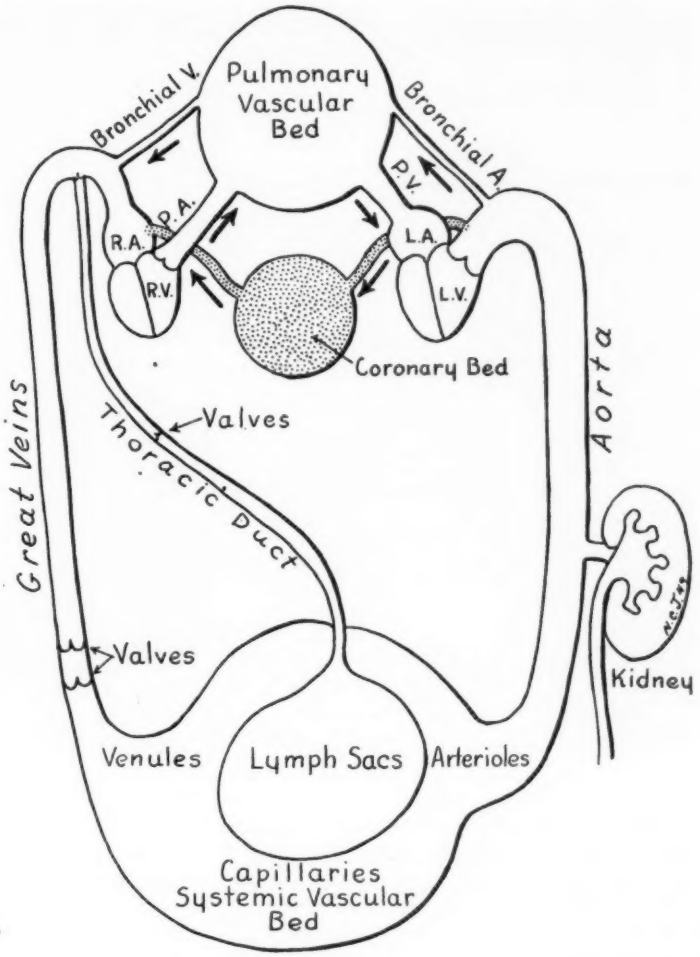


FIGURE 1. Diagram of circulation.

cranial pressure in emphysematous patients, and Cameron[11] has pointed out the frequency of papilledema. Davies and McKinnon[12] recorded extraordinary rises in intrathecal pressure when pure oxygen was administered to such patients.

The importance of this phenomenon is well illustrated by the following case recently observed in our clinic.

CASE REPORT

A 64-year-old man was admitted to our emergency ward with marked dyspnea and cyanosis. His respirations numbered 40, his pulse was 98, with a blood pressure of 210/110. There were bubbling râles indicative of pulmonary edema. He was conscious and able to answer simple questions. He was given morphine, DIGOXIN, and oxygen by pressure mask. One half hour later the cyanosis had cleared, but the patient was stuporous, with shallow respirations, 12 per minute. At the end of an hour he was unresponsive. Lumbar puncture revealed the intrathecal pressure to be 450 mm. and papilledema was noted. Blood drawn revealed the carbon dioxide combining power to be 100 vol. per cent; chlorides, 88 mEq.

Oxygen was given for 36 hours and then discontinued. After this cyanosis became more pronounced but the patient was more alert. Oxygen was again given for 20 minutes but the patient relapsed into stupor, which cleared as oxygen was again stopped. Observations were then made comparing the blood gases and spinal fluid pressure while the patient was breathing air and while breathing oxygen by pressure mask (Table 1).

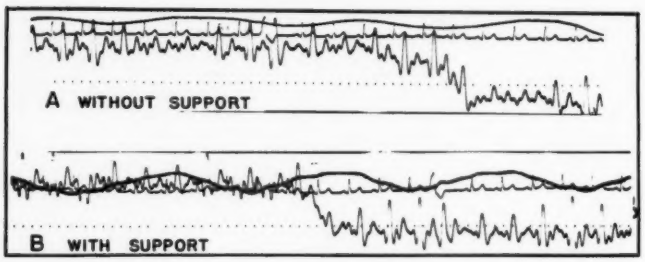


FIGURE 2. Large respiratory variation in amplitude of ballistocardiogram of a patient with angina pectoris. Note the small amplitude during expiration and improvement in pattern when abdominal support was used.

TABLE 1

EFFECT OF ADMINISTERING PURE OXYGEN BY PRESSURE MASK ON THE BLOOD GASES AND *p*H OF BLOOD OF A PATIENT WITH OBSTRUCTIVE EMPHYSEMA, WITH CONCOMITANT CHANGES IN INTRATHECAL PRESSURE

Oxygen capacity .....23.1 vol. per cent
Hematocrit .....51 per cent

	BEFORE OXYGEN MASK	AFTER 15 MINUTES OF OXYGEN
Oxygen content	16.15 vol. per cent	22.72 vol. per cent
Oxygen saturation	69.9 vol. per cent	98.4 vol. per cent
pCO_2 mm. of mercury	71.9	87.5
*p*H	7.3	7.18
SPINAL FLUID PRESSURE		
mm.H_2O	160	260

The emphysema in this case was of the obstructive type due to the presence of a rounded mass in the mediastinum, extending into the right upper chest as shown in Figure 3.

The complete explanation of the phenomenon observed is not to be found in the data obtained. It is clear, however, that the improved saturation of the blood when oxygen was given was accompanied by a fall in respiration rate, an increase in carbon dioxide and a decrease in the *p*H of the blood, leading one to believe that a carbon dioxide acidosis existed.

In a recent paper Comroe and his associates[13] have reviewed many of the known factors involved in such a situation. It may be said, however, that no completely satisfactory explanation of the phenomenon is at present available. The complex nature of carbon dioxide transport is well presented by Roughton.[14] Clinical observations available at present do not cover all the possibilities that are indicated by Roughton's work. It is obvious that our own data do not bear on many of the factors that may be involved.

We have 2 patients here that I would like to show you. They do not particularly illustrate the occurrence of cerebral symptoms and anginal pain; however, they do illustrate the different types of emphysema.

The patient who has just been brought in on the stretcher is a man 74 years of age who has had asthma for a very long time. He has had periods of almost complete relief and periods of marked disability. Allergic studies have not been very successful in locating his trouble. He had suggestive sensitivity to certain foods. He shows marked emphysema of the lungs.

The chest film shows the rather characteristic type of deep lungs with the flattened diaphragm which probably contain the essence of the picture—not a large heart, but rather small, relatively speaking.

This type of emphysema, of course, is easily recognized. He has the typical hyperresonant percussion note and the prolonged, low-pitched expiration which is characteristic of the large lung type. Undoubtedly, if one could ascertain the anatomic changes in his lungs one would, however, find evidence of arteriolar sclerosis in the pulmonary arterioles, possibly some increase in the size of his bronchial vessels, because as the pulmonary inflow diminishes the bronchial inflow increases, and there is undoubtedly here a situation which imposes a resistance to the transfer of blood from the right heart to the left in the arterial system of the lung, and also a decrease in the negativity of the intrapleural pressure, requiring greater increases in abdominal pressure to compensate for it in order to drive blood from the belly to the chest.

I would like the second patient to stand up for a moment while we look at him in profile, because he represents very well a type of emphysema that Dr. Kerr became interested in a number of years ago. As his center of gravity has moved forward, he has had to tilt his spine backward to get a good alignment; that throws

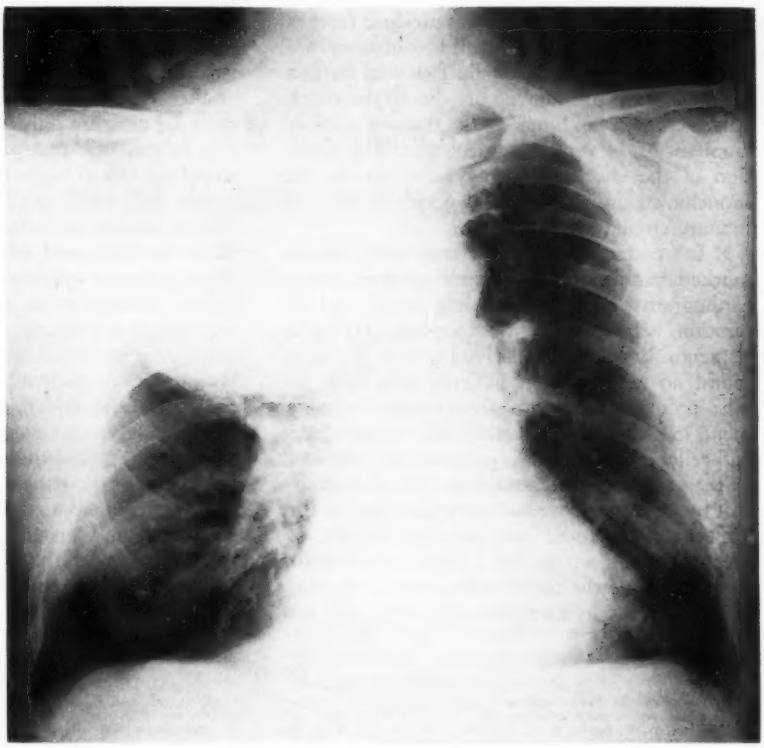


FIGURE 3. Roentgenograph of chest—obstructive emphysema due to mediastinal mass.

his head forward and brings his ribs up into an inspiratory position.

His lungs are not deep from top to bottom, and the characteristic appearances are not obvious. Yet I am sure this man has emphysema, and I think it comes about in this way: Due to relaxation of his abdomen there are probably occasions when, as he exerts himself, the pumping action of the diaphragm and belly muscles transferring blood from the belly to the chest may fall a little short of the need. If that alone should occur in the absence of any intrapulmonary obstruction, the left ventricular output might drop off just a little. If that occurred, it would be obvious that the pressure receptors on the aorta, possibly the pressure receptors in the carotid sinus complex, could be stimulated to cause him to overbreathe. If he overbreathes, he tends to blow off carbon dioxide and perhaps, unless it were compensated, diminish the retention of carbon dioxide of the blood and increase its alkalinity somewhat.

How might the lungs compensate for that overblowing of carbon dioxide? It would be easy to accomplish this by a little bronchoconstriction, thus increasing the residual air. I believe that could be a perfectly tenable hypothesis to explain the origin of postural emphysema such as this man exhibits, a type which depends upon an increase in the prominence in the abdomen, a change in the position of the spine and all the other things that come in its wake.

I must confess, however, that this man's trouble has not progressed to the point where he has any complaint which might be called angina pectoris. He is short of breath on exertion; he has no symptoms of confusion, blacking out, dizziness, lightheadedness or ataxia, such as many patients in this situation would have.

I think the additional factor we would need to bring on that situation with him would be the occurrence of a chronic bronchitis.

SUMMARY

1. In emphysema of the lungs severe paroxysms of coughing or expiration against a closed

glottis or against pressure may produce cerebral symptoms ranging from mild confusion and ataxia to syncope occasionally followed by convulsions. Such phenomena are due to the check-valve action of the lungs on the transfer of blood from the right ventricle to the left. The operation of the check valve may also involve the bronchioles and/or the blood vessels of the pulmonary circuit.

2. In patients with postural emphysema, marked variation in amplitude of the ballistocardiogram occurs between inspiration and expiration, being smaller in expiration. This phenomenon has been regularly observed. We have found no exceptions in patients who have angina pectoris, and in many instances improvement in the pattern of the ballistocardiogram and relief of the anginal symptoms are obtained by the use of an abdominal belt. I would qualify that by saying that we have usually failed in this respect if the patient had any considerable degree of varicose veins, and I think it is easy for you to see how the constriction around the middle of the body by an abdominal belt might impede the return of the blood from the legs to the belly and really embarrass the circulation still more than would be the case if the valves of the veins of the leg were intact and the abdominal pressure only was raised.

3. In cyanotic patients with emphysema, the use of oxygen in high concentration may induce stupor and coma, associated with evidences of carbon dioxide acidosis, a marked rise in intrathecal pressure and edema of the optic disks. These changes are usually reversible when the patient breathes room air again, but it seems to me that this situation is one in which we are frequently misled as to the cause of the cerebral symptoms. A patient with severe respiratory embarrassment and marked cyanosis may routinely be given oxygen by nasal catheter and such cerebral phenomena may occur to the great detriment of the patient, if his worsened condition is attributed to his disease rather than to its treatment. To combat this situation we must be cautious about the use of high concentrations of oxygen when emphysema and hypercapnia are known to exist.

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CLINICAL STUDY

Experience With Cortisone in the Treatment of Rheumatoid Arthritis

PAUL J. BILKA AND GORDON CADER*

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL, MINNEAPOLIS

The authors describe their clinical experience in the treatment of rheumatoid arthritis with cortisone. Several dosage schedules were used in an attempt to produce more lasting benefits from this powerful and dramatic agent. Encouraging results with combined cortisone and gold salts are recorded. Case histories are given illustrating the value of cortisone as an aid toward the rehabilitation of the seriously crippled arthritic patient.

Cortisone and ACTH are being used in increasing quantities and by an increasing number of physicians in the therapeutic management and investigation of a rather large variety of diseases. We wish to record some of our experiences with cortisone, and to draw attention to certain tentative conclusions regarding the use of this agent in the rheumatic disorders.

The case material of the present study is based on patients treated at the Arthritis Clinic or on the Medical Service of the University of Minnesota, and in the private practice of the senior author. A total of 36 cases was studied, of which 21 were female and 15 were male. Twenty-six patients were suffering from severe rheumatoid arthritis. Seven were classified as moderately severe, and three as mild.

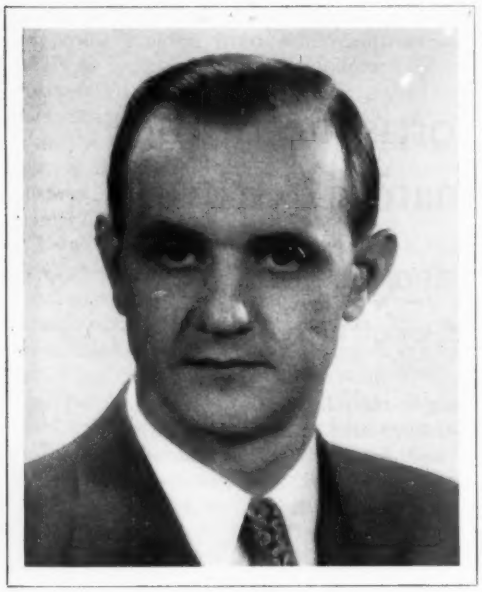
Most patients were seen daily and detailed records were made of subjective symptoms and objective joint findings. At each visit the patient was weighed and the blood pressure reading was recorded. No special dietary restrictions or additions were employed. Laboratory examinations in most cases consisted of weekly sedimentation rates and hemoglobin determinations, and routine urinalyses. When it seemed indicated, more detailed laboratory studies were done. We were impressed by the rarity of clinically significant disturbances in the electrolyte or metabolic balances of our patients on the dosage schedules employed.

*Department of Medicine, University of Minnesota Medical School, Minneapolis, Minnesota.

DOSAGES AND RATES OF CORTISONE ADMINISTRATION

Parenteral cortisone, given intramuscularly as a single daily injection, was the preparation used in the majority of our patients. However, oral cortisone was made available to us October 1, 1950,* and we have employed it in 15 patients. The antirheumatic effects seem, in every way, to be comparable to those obtained with the parenteral preparation with the oral form acting more quickly, and dissipating its effects more quickly. Dosage requirements were essentially the same with the two preparations, except that one patient required 25 per cent to 50 per cent more oral cortisone than intramuscular cortisone to maintain a given degree of rheumatic relief. It is too early to draw any conclusions concerning other physiologic and metabolic effects of the oral preparation, but our observations indicate no significant difference from parenteral cortisone. The facility of administering the oral tablets, however, makes for a more economical program for the average patient. By proper spacing of doses, many pa-

*Courtesy Merck and Co., Inc. Rahway, N. J. (J. M. Carlisle, M.D., Medical Director).



PAUL J. BILKA

tients can maintain a "smoother" course and more readily meet certain minor crises. Now that cortisone tablets are generally available, this method of administration is also open to many abuses which should make for extra caution on the part of the medical profession.

Patients were usually started on 150 to 200 mg. of cortisone for the first day or two, after which the dose was reduced to 100 mg. per day. We have found little advantage, in the majority of patients, in the initial high dosage schedules usually advocated. The 100 mg. per day dose was continued for two to three weeks for most patients, and then gradually tapered off. However, many variations in this plan were introduced depending on the individual circumstances or the particular issue under study. Total doses of cortisone ranged from 0.8 gm. to 9.975 gm., with most patients receiving 2 to 3 gm. The period of administration varied from one week to over five months.

ANTIRHEUMATIC ACTION OF CORTISONE

The typical response of the patient with active rheumatoid arthritis is that of a prompt lessening of stiffness and soreness, followed rapidly by decrease in pain and increased strength and use of the involved joints. Reduction in joint tenderness and swelling is evident within one week. Patients who have previously felt tired and run-down seem to acquire a new fund of energy. A mild euphoria is not uncommon. The basic nature of this antirheumatic action of cortisone is unknown. Some degree of improvement can be expected in all patients with active disease; however, where the rheumatic process is largely "burned out," little change can be expected. As a result, published statistics on percentage and degree of improvement will vary according to the selection of case material. The patients in the present study probably represent a fair sampling of the rheumatoid arthritis population; although initially patients were eliminated from the study because of relatively inactive disease, we later deliberately selected such patients in order to attempt their rehabilitation by combining vigorous physical therapy or orthopedic surgery with cortisone.

IMMEDIATE ANTIRHEUMATIC EFFECT OF CORTISONE IN 36 PATIENTS

Marked relief (more than 75 per cent)	22
Moderate relief (50 to 75 per cent)	6
Mild relief (less than 50 per cent)	8

HYPERCORTISONISM

Despite the relatively low dosage schedules, 25 per cent of the patients demonstrated some sign of hypercortisonism. No patient demonstrated a marked change and the majority of such changes were mild.

HYPERCORTISONISM

Moderate	2	25 per cent
Mild	7	

These changes consisted of slight "moon-face," minimal acneform eruption, ankle edema, mild mental stimulation, or mild depression. Two patients demonstrated more moderate signs in the form of fairly marked moon-face, buffalo hump, supraclavicular fat pads, and increased skin pigmentation. A transient mild glycosuria was observed in two patients, which disappeared although cortisone was continued.

COMPLICATIONS

Twenty-two per cent of our patients experienced some disturbance whose exact relationship to cortisone is somewhat uncertain, and which we have classified under the designation, complications. As contrasted to the symptoms of hypercortisonism which usually can be directly

related to dosage, the complications bore no such direct relationship. For instance, at the end of three weeks of therapy, and after a total dosage of 1.6 gm. cortisone, a 66-year-old white female patient with previous evidence of moderate "senile" osteoporosis, sustained a compression fracture of the eighth dorsal vertebra while lifting her 45-pound grandson. As she later stated, "I know I shouldn't have done it, but I felt so good, and he didn't seem at all heavy." Another patient slipped on a throw-rug and fractured her humerus while hurriedly getting out of bed in the morning!

COMPLICATIONS

NUMBER OF PATIENTS	8 (22 per cent)
Duodenal ulcer	1
Fractures	2
Ligamentous strain	4
Visual blurring	2
Post-Rx asthenia	1

Four patients developed localized areas of pain and tenderness below their knee joints which persisted despite improvement of their rheumatic symptoms, and which were relieved only by several days of bed rest. We have interpreted these as local areas of mechanical damage, probably ligamentous strains, as a result of excessive use of somewhat unstable joints.

One patient, a nurse 24 years of age, who had no history of previous gastrointestinal difficulty, developed pain in her right lumbar area after one month of therapy with cortisone. The pain, initially of a boring quality, became intermittent in type and one month later, a more severe peri-umbilical pain developed. Cortisone was stopped and the patient was admitted to the hospital surgical service for several days of observation. The pain abated somewhat, and the patient was dismissed from the hospital. Cortisone, for the control of her reactivated arthritis, was resumed. The abdominal pain increased in intensity. A gastrointestinal x-ray study revealed a deep, penetrating duodenal ulcer, which the roentgenologist felt might have recently perforated. Again cortisone was stopped and the patient was re-admitted to the hospital. She failed to obtain any relief from intensive medical management, and several weeks later a subtotal gastric resection was performed. Whether this is a direct or purely coincidental relationship between the use of cortisone and the development of the patient's duodenal ulcer, is impossible to say. However, the "masking" of the symptoms of other serious diseases represents a genuine hazard whenever cortisone or ACTH is employed.[1,2]

Two patients developed transient periods of visual blurring. These episodes seemed to be related to periods when certain signs of hypercortisonism, such as facial swelling or ankle edema, were evident. Ophthalmologic examination at this time disclosed no abnormality. It is possible that a slight change in fluid and electrolyte balance of the ocular humors may be responsible for the visual difficulty.

A significant post-therapy asthenia and rheumatic flare occurred in one patient. Starting three days after cortisone was stopped, this patient had a marked increase in all of his symptoms to a degree he had never experienced before. He was forced to stay in bed for a week, and during this time he experienced marked weakness and a severe burning pain in all of his joints. He then spontaneously and rapidly returned to his pretreatment base line, and was able to resume work. Atrophy of the adrenal gland in patients given cortisone has been described.[3] Temporary depression of adrenal cortical activity in patients who have received cortisone is also evident from studies of 17-ketosteroid excretion and eosinophil response to ACTH.[3]

EFFECTS AFTER CORTISONE IS STOPPED

As dramatic and pleasing as is the immediate improvement in the patient with rheumatoid arthritis upon the administration of cortisone or ACTH, almost equally dramatic and disappointing is the prompt return of symptoms in the majority of such patients, on cessation of cortisone or ACTH therapy. Although sufficient time has not yet elapsed for the prolonged follow-up of a very large number of patients, it is apparent that remissions in rheumatoid arthritis following the use of these agents are still the exception. Of the 23 cases treated by Hench and colleagues,[4] eight maintained the major part of their improvement for 7 to 14 months after therapy was stopped. Of eight cases treated by Boland and Headley,[5] only one sustained a major degree of improvement four weeks after cortisone was stopped.

Twenty of our patients have been followed for a month or more following cessation of cortisone therapy. As can be seen from the following table, the majority of patients soon lost all or most of their rheumatic improvement.

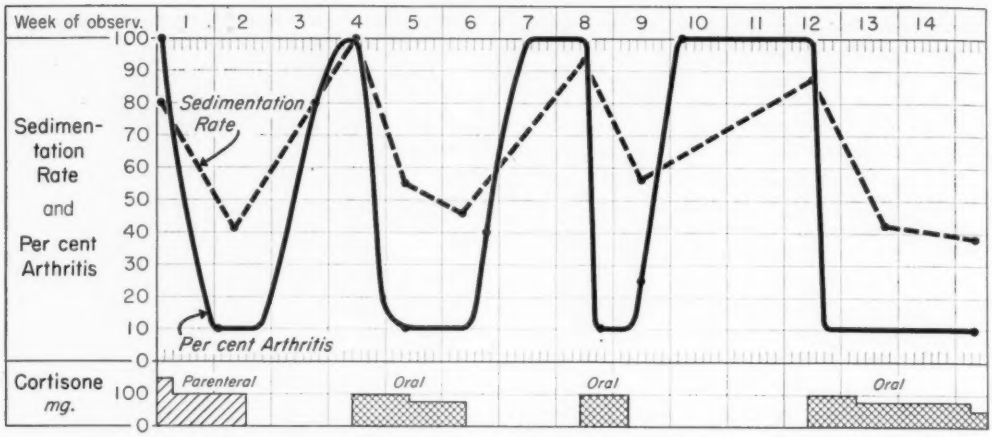


FIGURE 1. The response of a 58-year-old female with severe rheumatoid arthritis to several courses of cortisone.

EFFECT AFTER CORTISONE WAS STOPPED

	Number	*Per Cent*
Immediate loss of all improvement	10	85
Slower loss of improvement	7	
Retained major part of improvement	3	15

Only three patients have been able to maintain the major part of their cortisone-induced improvement. A careful examination of these various groups of patients gives no consistent clue as to the basis for the prompt regression of improvement on the one hand, or the sustained improvement on the other.

ATTEMPTS TO INCREASE "REMISSIONS"

It is apparent then, that one of the chief problems is that of increasing the number of patients who can maintain the benefit which they so dramatically acquired. Several programs of cortisone administration have been tried with this goal in mind:

1. *Heavy dosage of cortisone*—The continued use of cortisone above 100 mg. daily beyond the initial few days of therapy has not resulted in more rapid or more sustained improvement. It has, however, been responsible for a significantly higher incidence of hypercortisonism, thereby adding to the difficulty of management of these patients.

2. *Alternate-day administration*—Two patients were given 150 to 200 mg. cortisone on alternate days, following an initial two or three days of daily injections. One patient experienced moderate mental stimulation during the late evening on the days he received 200 mg. cortisone intramuscularly. This did not occur when the dose was reduced to 150 mg. It was this patient who experienced the marked increase in rheumatic symptoms on cessation of therapy. The other patient had a gradual return of symptoms over a one month period after cortisone was stopped.

3. *Repeated courses of administration*—Figure 1 is a graphic record of the usual response encountered in patients who previously have experienced a prompt rheumatic relapse on cessation of cortisone following its initial administration. However, two patients who had a somewhat gradual return of symptoms after their first course of cortisone, had an even slower return of symptoms after a second course.

4. *Moderate dosage administration with gradual tapering off*—This is the most usual schedule we followed. It appeared a fairly logical program, and for most patients is a practical one. Unfortunately most patients experience a beginning return of their symptoms when the dose is reduced below their individual requirement, and this usually portends a continued return of symptoms when therapy is stopped altogether. Figure 2 illustrates one of our more successful cases.

5. *Terminal administration of ACTH*—On the theory that cortisone has caused the adrenal cortices to "go to sleep," the administration, immediately after cortisone is discontinued, of a few doses of ACTH to "awaken" the adrenal, has been suggested. We have had no experience with this method other than the incidental use of ACTH for eosinophil response tests in sev-

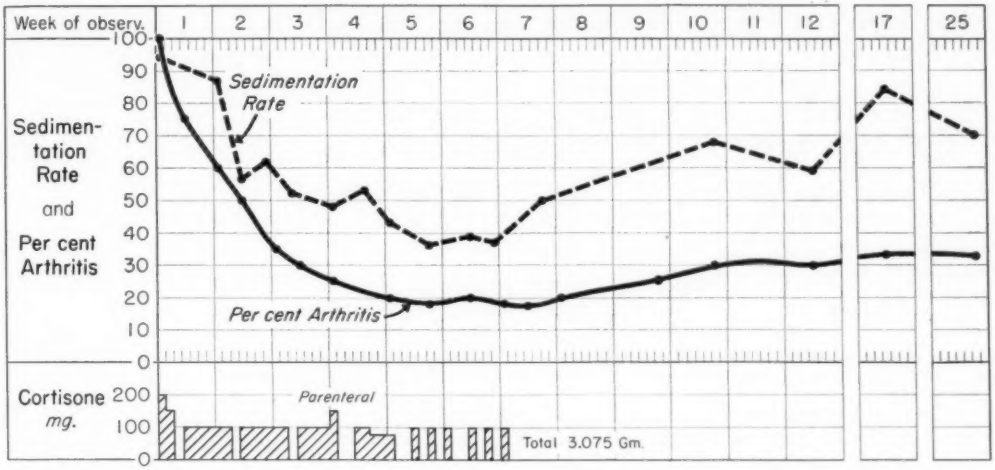


FIGURE 2. A favorable "long term" response to the gradual tapering off of cortisone in a 28-year-old male with rheumatoid spondylitis and rheumatoid arthritis.

eral patients. But in view of the rapid relapse usually seen in patients who have received ACTH alone, this does not seem to be a particularly promising procedure.

COMBINED CORTISONE AND GOLD

In an attempt to increase the remission rate following the cessation of cortisone, we have tried to draw upon experience with gold salts in the treatment of rheumatoid arthritis. Gold has been used in rheumatoid arthritis for more than two decades. Most reliable statistics indicate that where patients can tolerate these agents a "cure" rate of about 15 per cent can be expected, with approximately 50 per cent of additional patients sustaining significant relief.[6] The logic of combining an agent such as cortisone, which can induce immediate and marked improvement, with an agent such as gold salts, which often can produce a less dramatic but more sustained improvement, occurred to the authors as it has undoubtedly occurred to other workers in the field of rheumatic diseases.

We have thus far treated six patients with the soluble gold salt preparation, aurothioglucose,* in addition to cortisone. The initial dose of gold, 5 to 10 mg. given intramuscularly, was rapidly increased to 50 mg. doses given every five to seven days. Three patients were started on gold alone and subsequently given cortisone for variable periods. Three patients were started on both cortisone and gold, the cortisone being discontinued after several weeks, while the administration of gold salts was continued.

*Courtesy Schering Corporation (R. W. Burlew, M.D., Medical Department).

CASE REPORTS

Case 1—A 24-year-old white female nurse was seen on October 19, 1950. She gave a history of gradual onset of pain, stiffness, swelling, and tenderness in several proximal phalangeal joints of the left hand over the previous month. There was gradual spread to the left knee and ball of the left foot and an associated malaise and temperature rise to 102° F. At the time of examination, there was tenderness and swelling of the left knee, the left first and second metatarsal joints, and the second left proximal phalangeal joint. Sedimentation rate was 16 mm. per hour (Westergren). The impression was that of early rheumatoid arthritis and the patient was put to bed and placed on a large dosage of salicylates, high caloric, high vitamin diet, and simple physical therapy.

During the next two weeks, despite the program of conservative management, the patient had progression of her joint involvement to her right knee and right foot and left shoulder, with greater involvement of her previously affected joints. At this time her sedimentation rate was 58 mm. per hour. The patient was started on oral cortisone, 100 mg. per day in divided doses. She was also given an initial dose of 10 mg. of gold salt (aurothioglucose). Within 24 hours, there was less stiffness and pain in all of her joints. On the third day, the patient voluntarily stopped taking aspirin.

After one week, the patient estimated she was rid of 50 per cent of her arthritis, and objective examination of her joints indicated at least this degree of improvement. The sedimentation rate had fallen to 35 mm. per hour. Gold was continued with increasing dosage, and cortisone was continued at the 100 mg. per

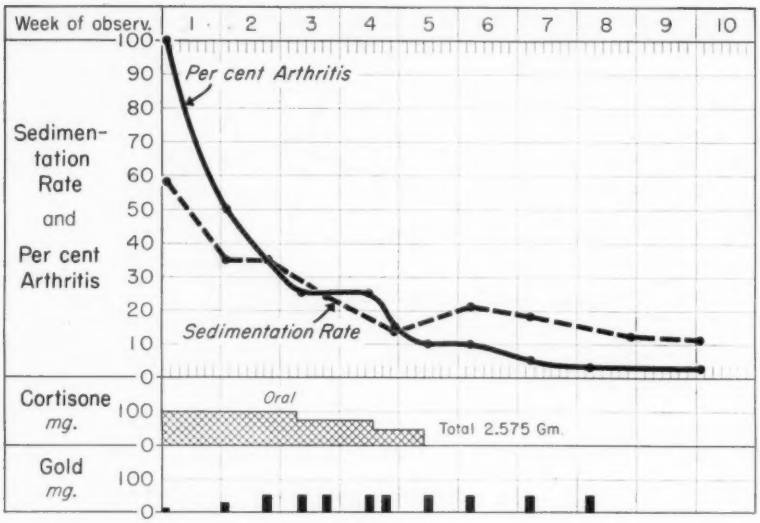


FIGURE 3. Combined cortisone and gold therapy in a 24-year-old nurse with rheumatoid arthritis.

day dosage for 16 days when it was decreased to 75 mg. per day. (See Figure 3.) The patient's improvement was progressive and after 25 days, dosage of cortisone was reduced to 50 mg. a day. At the end of 31 days, and after a total dosage of 2.575 gm., cortisone was discontinued. The patient was rid of 90 per cent of her arthritis at this time, and the sedimentation rate was 13 mm. in one hour.

Gold was continued at the dosage of 50 mg. per week, and in spite of a temporary rise in sedimentation rate to 21 mm. over the next week, her improvement increased and after 10 days the patient resumed her work as a nurse, working just four hours per day. Two weeks later her improvement was fully maintained, and her work allowance was increased to six hours per day. One month after cessation of cortisone the patient was completely free of arthritis, except for occasional mild aching in one knee and a very minimal amount of tenderness in one metatarsal joint. Her sedimentation rate was 11 mm. per hour. The patient is now working a full eight-hour day.

Case 2—A 57-year-old white female patient with rheumatoid arthritis had steady progression of her disease except for a one year interval four years ago, during which time she had been receiving intramuscular gold salts. The gold was discontinued because of a skin rash and after about a year, the patient's symptoms increased, and during the last six months had been especially severe. In view of the past response to gold, this patient was started with an initial dose of 5 mg. of aurothioglucose, and at the same time begun on cortisone.

There was very rapid improvement in her rheumatic symptoms. After two weeks, cortisone was given every other day, and after a total of 3.1 gm. cortisone had been given over a period of six weeks, this medication was discontinued, but the gold was continued. Two weeks after her last dose of cortisone the patient had experienced no increase in rheumatic symptoms nor were her objective findings changed. During the next week, there was a slight increase in stiffness which did not change appreciably over the subsequent three weeks. Five weeks after her last dose of cortisone, the patient estimated she had lost only 5 per cent of her maximal improvement.

Case 3—A 58-year-old white female with rheumatoid arthritis of six months' duration was started on weekly injections of gold August 4, 1950. Three months later, after a total dose of 560 mg. gold, the patient estimated she had experienced approximately 25 per cent improvement in her arthritis. At this time, the patient was given oral cortisone, 100 mg. a day for three days, followed by 75 mg. for four days, making a total of 600 mg. in one week. The patient experienced a 50 per cent improvement in her rheumatic symptoms. Her sedimentation rate during this one week fell from 74 mm. to 54 mm. per hour. Gold alone was continued, and after about a week following her last dose of cortisone, the patient experienced a slight increase in stiffness with the very gradual return of rheumatic symptoms to about 75 per cent of the pre-cortisone level. At this time the patient was again given oral cortisone for one week following the same dosage schedule as during the first course for an additional total of 600 mg. The patient experienced more marked improvement from this course to the extent of being rid of 70 per cent of her arthritis. The patient maintained this full level of improvement for approximately two weeks, when she had a gradual return of stiffness and aching. One month after the completion of her second course of cortisone, the patient was still free of 50 per cent of her arthritis. Gold is being continued at the rate of 50 mg. per week.

Case 4—A 28-year-old white female with progressive rheumatoid arthritis of three years' duration was started on combined gold and cortisone therapy. After a total dosage of 1.15 gm. cortisone given over a period of

two weeks, the patient was continued on gold alone. At this time she had sustained an 80 per cent improvement in her arthritis and her sedimentation rate decreased from 52 mm. to 21 mm. per hour. During the first week following cessation of cortisone, the patient lost about 30 per cent of her rheumatic improvement. However, she then continued at this level for approximately three weeks without change. At this time, the patient developed a severe cold and had a rapid increase in joint stiffness, pain and swelling. To control this rheumatic flare, the patient was restarted on oral cortisone. This patient recently developed a skin rash as a result of which gold is being discontinued temporarily.

Two other patients have been given combined gold and cortisone therapy. However, it is too soon following the discontinuation of their cortisone to determine whether or not they will be able to maintain the marked improvement in their rheumatoid arthritis which followed the addition of cortisone to their gold program.

It would appear that the results in the four patients described here are significantly different from what might have been expected had they been given cortisone alone. Obviously, it will be many months before valid conclusions can be drawn. However, this preliminary study would appear to be encouraging.

CORTISONE IN OSTEOARTHRITIS

CASE REPORT

A female patient, 56 years of age, with severe osteoarthritis of the right hip of three years' duration was given 200 mg. of cortisone a day for two days, followed by 100 mg. per day for four days, making a total dosage of 800 mg. in six days. There was no change in the range of motion of the hip joint. The mild fibrositic symptoms, such as stiffness on taking her first steps after resting for an hour or so, were moderately improved. However, the patient still limped markedly and had about the same amount of pain on walking and her tolerance for activity was unaffected.

Cortisone has no effect upon the basic pathologic process in osteoarthritis. Where significant fibrositic features are present, these may be transiently relieved by cortisone.

CORTISONE COMBINED WITH INTENSIVE PHYSICAL THERAPY

It has been a common observation for patients with mild or recent flexion contractures of various joints to find these previously deformed joints straightened out and returned to a normal range of motion often within a matter of days after the initiation of cortisone therapy. More severe or long-standing contractures, however, are only partially relieved. In these instances, physical therapy is of special value. The marked reduction in the active rheumatoid process due to cortisone allows for more intensive physical therapeutic measures. Joints can be manipulated with the production of much less pain and muscle spasm. The patient can more actively participate in muscle training.

So convinced are we of its value, that we have made physical medicine an integral part of the program of almost all patients to whom we have given cortisone.

CASE REPORT

A 27-year-old white male with rheumatoid arthritis and rheumatoid spondylitis of eight years' duration was seen in July, 1950. Although there was little evidence of active disease at the time of examination, the patient had a rigid spine which was in a position of fairly marked forward flexion. Three weeks of daily physical therapy produced no change in his status. The patient was then started on cortisone and the daily physical therapy was continued. After one month, the patient's height increased three-fourths of an inch. The benefit of this straighter position was very apparent to the patient, especially in terms of allowing him to walk with a better forward range of vision, rather than looking down to the sidewalk.

When cortisone was stopped on the forty-eighth day, after a total dose of 2.875 gm., the patient's height had increased a total of 1⅛ inches. In addition to height increase, the patient had experienced much less stiffness and soreness. The latter improvement was gradually lost following the discontinuance of cortisone; however, by the use of simple home physical therapy the increase in height has been maintained some four months later.

This case illustrates the value of combined cortisone and physical therapy with the maintenance of a mechanical gain, despite the recurrence of the active rheumatic symptoms on cessation of cortisone.

CORTISONE AS AN AID TO ORTHOPEDIC SURGERY IN RHEUMATIC PATIENTS

Perhaps one of the greatest benefits to be derived from the use of cortisone will be its aid in the rehabilitation of the crippled arthritic through various orthopedic reconstructive procedures. The orthopedist has always rightfully feared performing surgery on these patients due to the risk of precipitating a rheumatic flare which would often more than undo the good of the specific operation. With cortisone and ACTH, we have hope that this danger is past.

CASE REPORT

A 31-year-old male patient with a bilateral ankylosis of the hips due to severe rheumatoid spondylitis of 15 years' duration, was seen in consultation with the Orthopedic Department of the University Hospitals. There was little evidence of active disease, and except for the rigid spine and ankylosed hips, the patient was in excellent health. Arthroplasty with a VITALLIUM cup was decided upon and the left hip, and presumed most difficult side, was selected for the first operation.

The patient was given 100 mg. cortisone the day before surgery and this dosage was continued daily thereafter. The patient had an unusually benign postoperative course. Except for a mild headache a few hours after surgery for which he was given ½ gr. codeine, no narcotics or analgesics were necessary. The patient experienced no muscle spasm and was able to move his hip through a fair range of motion. In fact, he was so active in the use of this limb that the surgeon was concerned lest the newly created joint become too mobile and be improperly molded. Therefore, the patient was temporarily placed in a splint. Cortisone was discontinued on the fifteenth postoperative day. The patient remained free of any rheumatic symptoms. However, on the eighteenth day, an iritis of the right eye developed which, after two days of failure to respond to local therapy, was promptly relieved by cortisone.

As a control measure, the arthroplasty on the right hip was performed without the concomitant use of cortisone. The immediate postoperative course was strikingly different from that of the first procedure. There was considerable local pain and muscle spasm which required the use of narcotics for two days, and the placing of the right lower limb in traction. When it was possible to start physical therapy, there was moderate resistance to passive motion. The patient was not able to perform active motion except with the limb in traction.

The lessened pain and muscle spasm and greater ease of carrying out physical therapy during the first of two hip cup arthroplasties when cortisone was used, as compared with the second arthroplasty when cortisone was not used, were very apparent. Although no joint flare occurred following the cessation of cortisone, the patient did develop an attack of iritis which was promptly controlled by temporarily resuming cortisone. No delay in wound healing was observed following either of the two major procedures.

SUMMARY

THIRTY-SIX patients with rheumatoid arthritis were treated with cortisone. Oral and parenteral routes of administration have been used.

Eighty per cent of these patients were rather dramatically relieved of over half of their arthritis. The remaining 20 per cent obtained a lesser degree of relief.

Eighty-five per cent of all patients had a prompt return of their symptoms when cortisone was stopped.

Despite the relatively low dosage schedule of cortisone, 25 per cent of the patients developed some sign of hypercortisonism. None of these changes was serious.

Twenty-two per cent of the patients developed some complication, of which a questionable perforated duodenal ulcer was the most serious.

Several schedules for administering cortisone have been tried in an attempt to increase the remission rate after cortisone is stopped.

Encouraging results have been observed in a small number of patients treated with combined cortisone and gold salts.

The value of cortisone as an aid toward the rehabilitation of the seriously crippled rheumatoid arthritic through the use of intensive physical therapy and orthopedic surgery is discussed.

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Scientific Exhibit

Congenital Heart Lesions

STUDY, DIAGNOSIS AND SURGICAL TREATMENT

CHARLES D. MARPLE*

UNIVERSITY OF CALIFORNIA SCHOOL OF MEDICINE, SAN FRANCISCO

Classification of Congenital Heart Lesions

I. Positional defects
   - A. Dextrocardia with or without situs inversus
   - B. Levocardia in situs inversus
   - C. Anomalous origin of left descending coronary artery from pulmonary artery

II. Outflow tract lesions of left heart—acyanotic
   - A. Anomalies of aortic arch (aorta normally from left 4th bronchial arch)
     1. Right aortic arch (persistent right 4th bronchial arch
     2. Double aortic arch (persistent right and left 4th bronchial arches)
     3. Anomalous right subclavian artery (posterior to trachea from origin distal to left subclavian artery)
     4. Coarctation of aorta
     5. Patent ductus arteriosus—persistent fetal connection between aorta and pulmonary artery
     6. Defect in aortic septum
   - B. Valve defects
     1. Aortic
     2. Subaortic stenosis
     3. Mitral, e.g., Lutembacher's syndrome

III. Outflow tract lesions of right heart—cyanotic
   - A. Combined defects
     1. Tetralogy of Fallot
     2. Taussig heart—extreme dextroposition of aorta
     3. Transposition of great vessels
     4. Hypoplastic right ventricle (tricuspid stenosis) (tricuspid atresia)
     5. Hypoplastic left ventricle (mitral stenosis) (mitral atresia)
     6. Aortic atresia
     7. Truncus arteriosus
   - B. Ebstein's disease—downward displacement of tricuspid valve
   - C. Pulmonary veins emptying into right auricle

IV. Intertract lesions
   - A. Interauricular septal defect. Patent foramen ovale
   - B. Interventricular septal defect—muscular portion, membranous portion (more common)
   - C. Cor biloculare
   - D. Cor triloculare
   - E. Common atrioventricular canal

V. General measures for congenital cardiacs
   - A. Immunization—particularly pertussis
   - B. Readily digested food, extra vitamins
   - C. Foci of infection—particularly teeth
   - D. Role of hydration, weather
   - E. Role of digitalization, anesthesia

An exhibit prepared by the Department of Medical Illustration, University of California, for the Cardiovascular Board and the Congenital Heart Study Group, University of California School of Medicine. Contributors: Drs. William Ashley, Ellen Brown, James Hopper, Jr., William Kerr, Sanford Leeds, Earl Miller, Jacques Nowack, Mary Olney, Maurice Sokolow and H. Brodie Stephens.

**Assistant Clinical Professor of Medicine and Coordinator, Cardiovascular Board, University of California School of Medicine, San Francisco, California.*

INCIDENCE OF CONGENITAL HEART DEFECTS

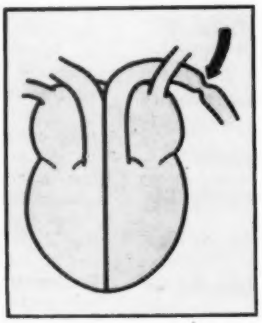
In Abbott's 1,000 cases, the most common defects, often in combination, were:

Interauricular septal defects	373 cases
Interventricular septal defects	274 cases
Simple patent ductus arteriosus	242 cases
Pulmonary stenosis	151 cases
Anomalous cusps of semilunar valves	146 cases
Coarctation of the aorta (adult type)	105 cases
Anomalies of the great veins	94 cases
Complete transposition, arterial trunks	74 cases

MULTIPLE CONGENITAL HEART DEFECTS

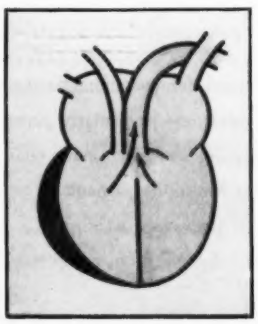
Cases with multiple congenital cardiovascular lesions are more common than those with single defects, especially with interauricular defects, pulmonary stenosis, interventricular defects, and patent ductus arteriosus.

Normal

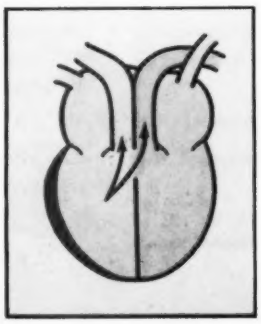


Coarctation of the aorta

Patent ductus arteriosus



Tetralogy of Fallot



Eisenmenger complex

Interauricular septal defect

RECOGNITION OF CONGENITAL HEART DISEASE IN THE PHYSICIAN'S OFFICE

MOTHER

History of: Rubella, other virus infection, or bleeding during first trimester.

CHILD

History of: Poor weight gain. Poor feeding.
Constipation. Syncopal attacks.
Recurrent respiratory infections.
Difficulty in swallowing. Stridor.
Dyspnea, usually intermittent on exercise; may assume squatting position.
Cyanosis, intermittent/continuous.

Physical findings: Retarded physical and/or mental development, or malnutrition.
Dyspnea (at rest/with exercise), *c/s* squatting phenomenon.
Cyanosis (intermittent/continuous) *c/s* clubbing and dilated capillary beds.
Deformity and asymmetry of chest.
In coarctation, hypertension upper limbs, hypotension lower limbs. Diminished femoral pulsations.
Bruits.
Altered pulse pressures.
Cardiac murmurs *c/s* thrills (usually "organic" type, consider location, intensity, quality, transmission).
Other congenital defects.

Laboratory: Polycythemia. Increased hematocrit.
Electrocardiographic abnormalities.
Abnormalities on radiologic examination.
Abnormal circulation times.

Complications: Cardiac arrhythmias.
Congestive heart failure.
Subacute bacterial endocarditis.
Cerebrovascular accidents *c/s* hemiplegia.

EVALUATION OF CONGENITAL HEART DISEASE IN THE MEDICAL CENTER

Procedure at University of California Hospital

BASIC EXAMINATION AND STUDY

History — Physical Examination
Laboratory Studies — Radiologic Study
Electrocardiography

↓

PRESENTATION OF CASE AND DISCUSSION BY CONGENITAL HEART STUDY GROUP

Study group consists of representatives from Pediatrics, Surgery, Medicine, and the Laboratory specialties. Each case discussed in detail with emphasis on bedside methods of diagnosis. Physical signs analyzed and laboratory findings integrated with them. Consultative recommendations are made concerning diagnostic conclusions, plan for further diagnostic studies and treatment.

↓

SPECIAL DIAGNOSTIC STUDIES MAY INCLUDE

Arterial oxygen determination and oximetry.
Differential circulation times.
Radiologic study using contrast media.
Additional electrocardiographic study.
Electrokymography and phonocardiography.
Cardiac catheterization.
Blood volume determination.

↓

REVIEW OF CONGENITAL HEART STUDY GROUP

Initial interpretation and recommendations revised in light of additional information.
Revised opinion for management summarized and provided the attending physician.

↓ ↓

SURGICAL INTERVENTION — MEDICAL MANAGEMENT

↘ ↙

PERIODIC FOLLOW-UP

ROENTGEN ELECTROKYMOGRAPHY

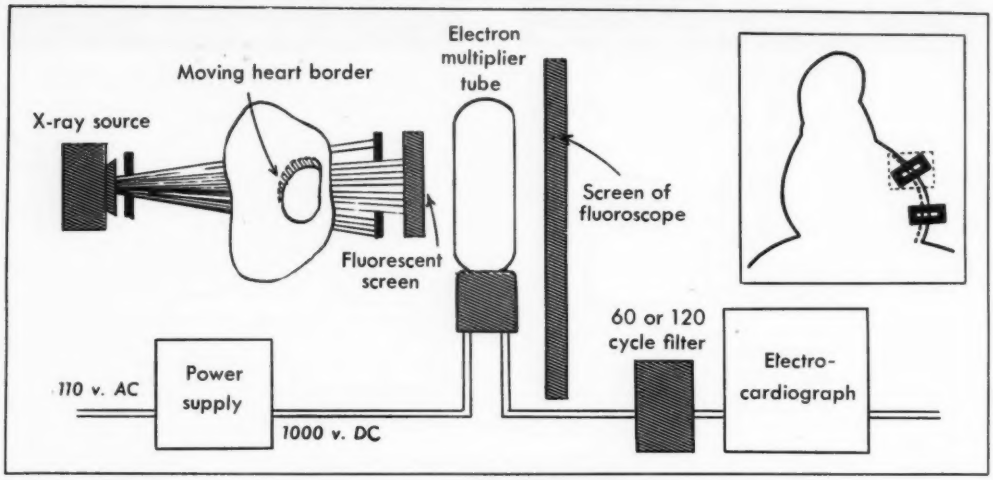
The electrokymograph is utilized chiefly for the production of graphic records of the motion of shadow borders and of the density changes in a fluoroscopic image. As the heart and the great vessels go through their cycle of systole and diastole, two types of associated changes take place in the fluoroscopic shadow image: (1) Motion of the shadow borders and (2) changes in intensity due to changes in the thickness of the pulsating organ. The electrokymograph converts these changes in the fluoroscopic shadow image into variations in an electric current, and these may be recorded by any suitable recording galvanometer, as, for example, an electrocardiograph.

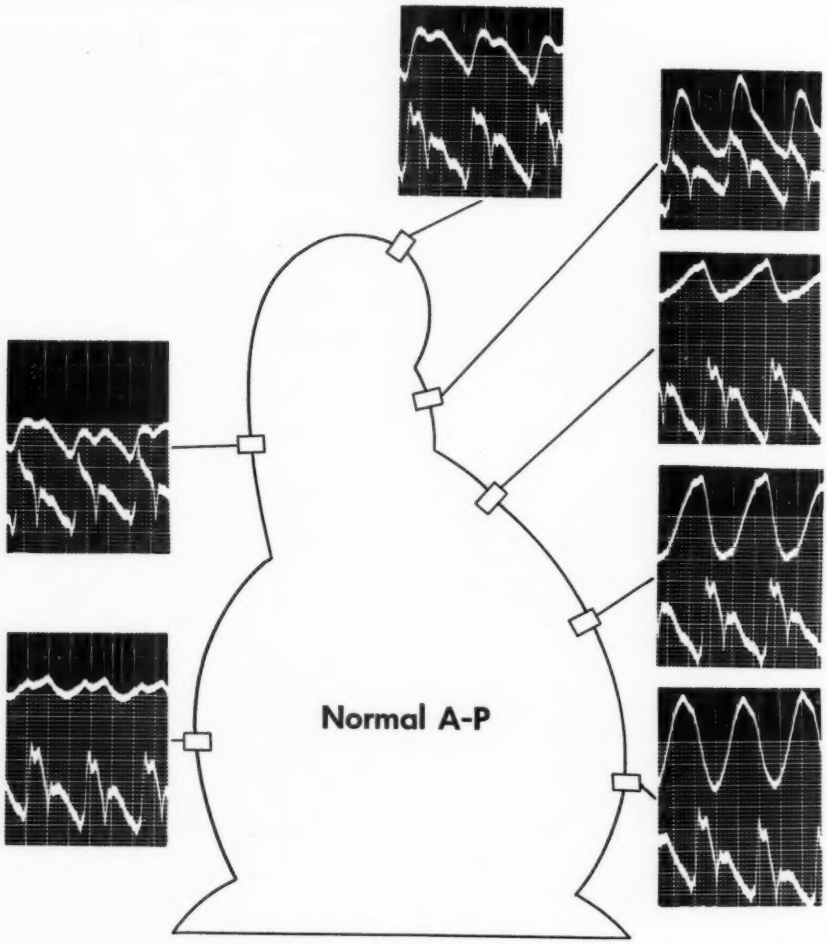
Electrokymograms may be obtained from shadow border motion of the several cardiac chambers and the outflow tracts in various angles of projection. Records of changes in thickness can be obtained readily by aligning the aperture with the appropriate shadow area. The method is applicable to the study of cardiac physiology and to clinical observation. It has been used to study asynchronism of ventricular ejection in normal patients and in those with bundle branch block. It has been used to study patients with myocardial infarction, including those who have developed ventricular aneurysms. It is being investigated in conditions where pulmonary pressures are expected to undergo significant changes.

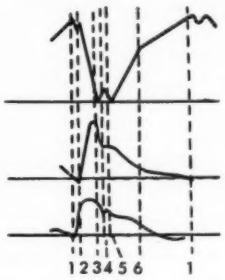
By means of simultaneous recordings of heart sounds, electrocardiograms, carotid pulse tracings and electrokymograms along the left ventricular border, the various phases of the cardiac cycle may be demonstrated in an integrated manner.

The chief deterrent to the exploitation of this instrument is the lack of calibration which would make possible the quantitative assessment of the changes which are observed. Efforts are being made at the present time to provide such calibration, though with no great promise of immediate success.

ROENTGEN ELECTROKYMOGRAPHY







Electrokymographic curve of left ventricular border

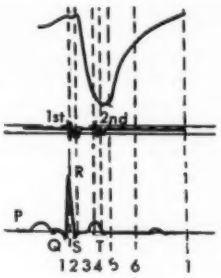
Electrokymographic curve of aortic knob border

Experimental aortic pressure curve

Experimental ventricular volume curve

Heart sounds

Electrocardiogram

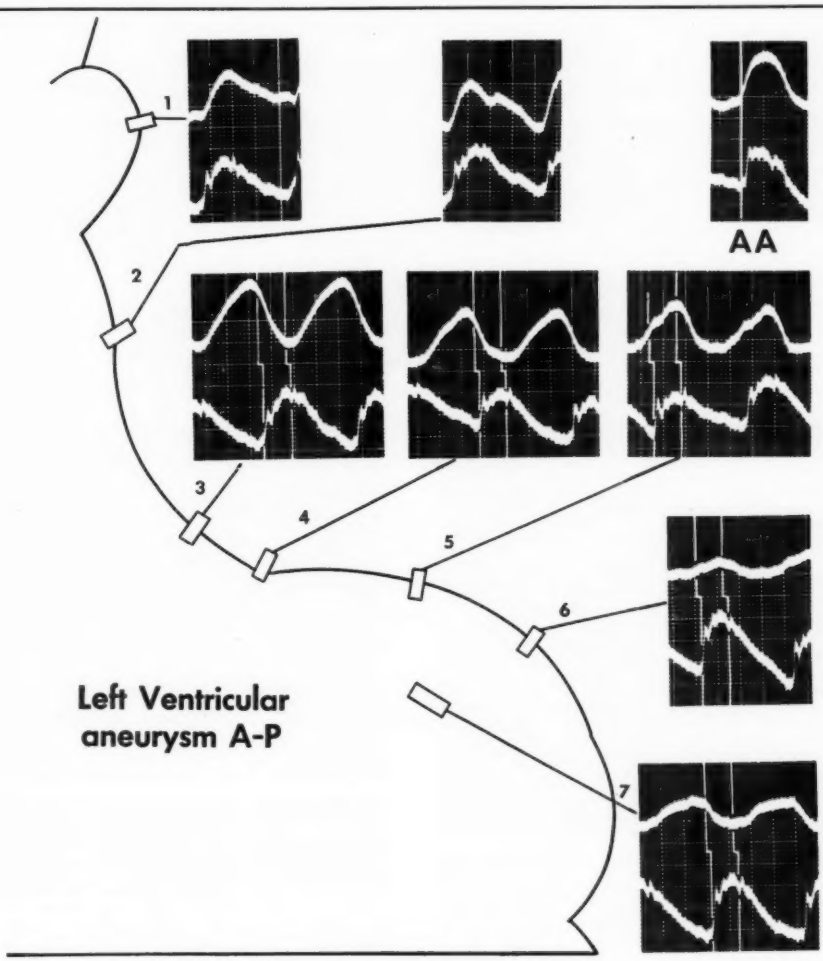


SYSTOLE

1-2 Isometric contraction
2-3 Systolic ejection
3-4 Protodiastole

DIASTOLE

4-5 Isometric relaxation
5-6 Rapid ventricular filling
6-1 Slower ventricular filling



DIAGNOSTIC VALUE OF UNIPOLAR ELECTROCARDIOGRAMS IN CONGENITAL HEART DISEASE

To determine their diagnostic value, complete *unipolar electrocardiograms* were obtained in 153 patients with various types of proved congenital heart disease. Thirty-eight of the cases were studied at autopsy.

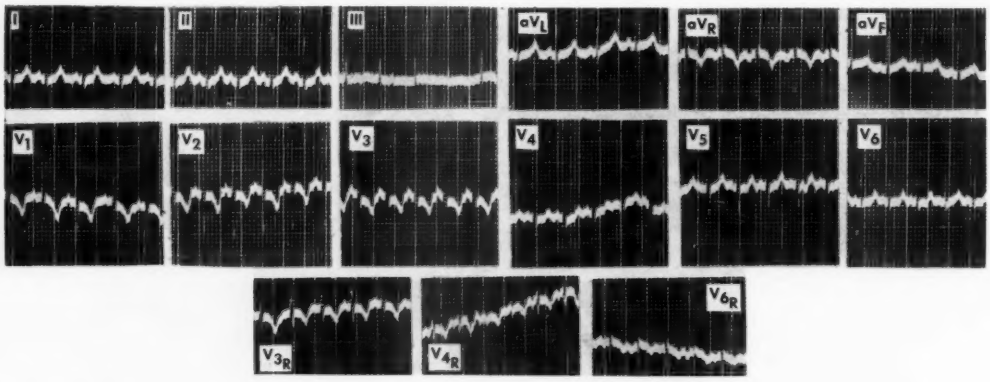
A Summary of 153 Cases with Proved Diagnosis of Congenital Heart Disease and Complete Unipolar Electrocardiograms

Acyanotic	82
Patent ductus arteriosus, uncomplicated	39
Coarctation of the aorta	32
Interauricular septal defect	10
Subaortic stenosis	1
Cyanotic	71
Tetralogy of Fallot	40
Tetralogy plus additional lesions	5
Transposition of great vessels	5
Trilocular heart	3
Eisenmenger's complex plus additional lesions	3
Tricuspid atresia with rudimentary right ventricle	4
Truncus arteriosus	4
Miscellaneous	12

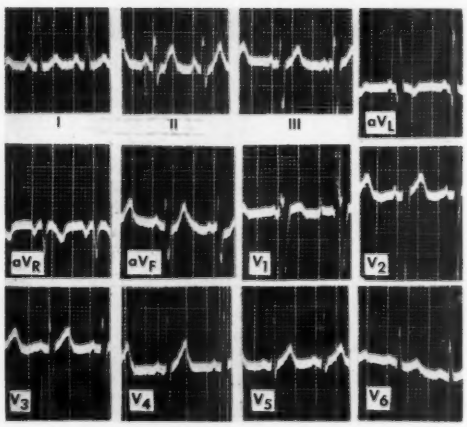
Reliability of Criteria of Ventricular Hypertrophy in Congenital Heart Disease as Determined at Autopsy

38 Autopsies

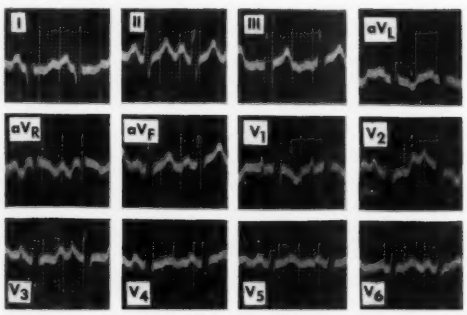
1. Right ventricular hypertrophy diagnosed electrocardiographically in 28 cases; autopsy revealed right ventricular hypertrophy in all.
2. Left ventricular hypertrophy diagnosed electrocardiographically in 7 cases; autopsy revealed left ventricular hypertrophy in all.
3. Electrocardiogram normal in 1 case; no cardiac hypertrophy found at autopsy (2-week-old infant).



E. P., age 11 weeks. Normal infant.



W. H. W., male, age 17 months. EKG of 10/27/49. Tricuspid atresia and intra-atrial septal defect. Striking clinical improvement following Blalock operation done on 12/20/49. Changes in aVL are those of left ventricular hypertrophy.



K. M. W., female, age 2 years. Cor triloculare or biloculare, large interauricular defect with endocardial band separating lower sixth of the atria. Small rudimentary right ventricle with a capacity of 5 cc. communicating through a 3 mm. slit with a hypertrophied left ventricle (1 cm.; 89 gm.). Pulmonary artery small. Aorta normal. Joint mitral and tricuspid valves with wide opening. Cyanosis, clubbing, mental and physical retardment since age of 3 months. Systolic murmur and thrill maximum in left 2nd and 3rd interspaces.

4. Unusual right axis deviation without definite evidence of right ventricular hypertrophy diagnosed electrocardiographically; autopsy revealed right ventricular hypertrophy. 1 case.

Cyanotic Cardiac Lesions Associated with Left Axis Deviation or Pattern of Left Ventricular Hypertrophy

Tricuspid atresia with nonfunctioning right ventricle	3
Tetralogy and large patent ductus arteriosus	2
Truncus arteriosus and patent ductus arteriosus	1

Coarctation of the Aorta

Total Cases	32
Electrocardiogram revealed:	
Left ventricular hypertrophy	19
Within normal limits	6
Right bundle branch block	2
Right ventricular hypertrophy	5*

**These 5 had associated lesions and/or cardiac failure. Right ventricular hypertrophy was confirmed at autopsy in all.*

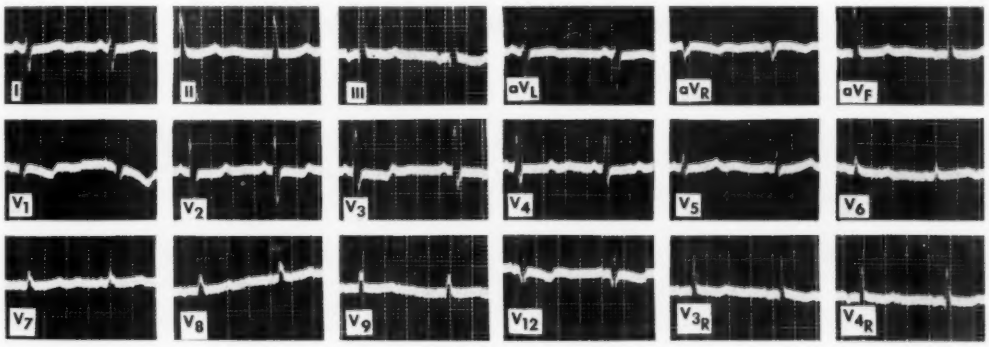
Patent Ductus Arteriosus (39 Patients)

Electrocardiograms in uncomplicated patent ductus arteriosus	39
Left ventricular hypertrophy	17
Within normal limits	21
Incomplete	1

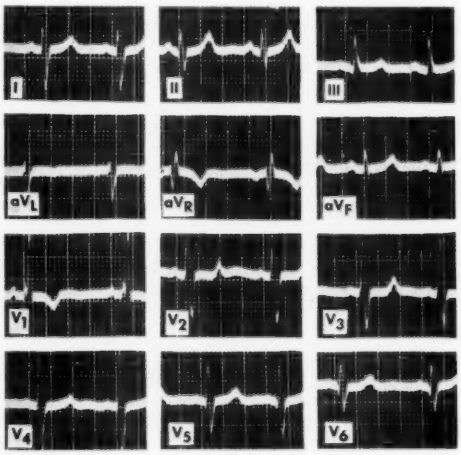
Diameter of the ductus

Of the 17 with electrocardiographic signs of left ventricular hypertrophy, at least 9 equalled or exceeded 1 cm. in diameter.

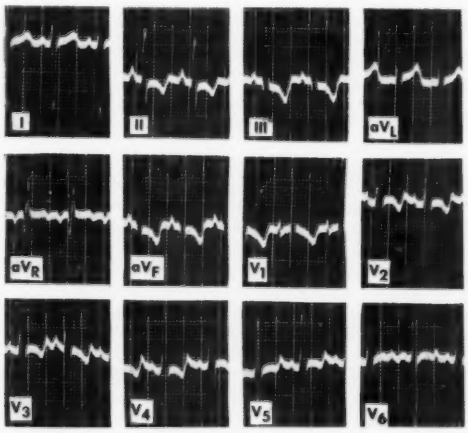
Of the 21 with normal records, none exceeded 1 cm. in diameter.



D. H., female, age 27 years. Record of 5/23/49. Cyanotic congenital heart disease. Probable tetralogy of Fallot. Pulmonary artery pressure at surgery was 29 cm. H_2O. Cardiac catheter studies revealed pressure in the right ventricle of 60 cm. H_2O, of the pulmonary artery of 10.5 cm. H_2O. O_2 saturation, 79%. HG. Hgb., 22.1 gm.; RBC, 7.2 million; PCV, 65 vol. %. Considerable improvement following Blalock procedure and on 9/22/49 Hgb., 102%; RBC, 5.5 million; PCV, 55 vol. %.



F. L., male, age 7. Congenital heart disease with pulmonary atresia. Marked right ventricular hypertrophy.



L. T., male, age 15 years. Inter-atrial septal defect proved by cardiac catheterization. R.V. pressure 68 cm. H_2O; O_2 content R.A. 12.1 vol. %; that of S.V.C., 7.9 vol. %. P.A. pressure 68.3 cm. H_2O. Cyanosis, clubbing and dyspnea on effort. EKG typical of right ventricular hypertrophy.

CATHETERIZATION OF THE RIGHT HEART

The physiologic methods used in instances where catheterization is desirable are: (1) right heart catheterization, (2) arterial puncture, and (3) collection of expired air for measuring oxygen consumption.

The technic of right heart catheterization, first demonstrated by Forssmann in 1929 and established as a safe and useful method by Cournand, et al., affords a means of obtaining samples of mixed venous blood from the right heart and the pulmonary artery. Variations in the oxygen content of blood samples from the right auricle, the right ventricle, and the pulmonary artery are small in the normal subject, but may be large when there are abnormal communications between these structures and the pulmonary vein, the left auricle, the left ventricle, or the aorta. The arteriovenous oxygen difference can be calculated readily from the data obtained by these three methods. The calculation of blood flow in the systemic and pulmonary circuits and of blood shunts through abnormal communications is done according to simple formulas.

Right heart catheterization and arterial puncture permit the recording of blood pressures. The normal curves of pressure for the right or left auricle, the right or left ventricle, the pulmonary artery, the aorta and the peripheral arteries are known. Blood pressure recordings may be used to identify the cavity or vessel in which the tip of the catheter lies, or to study the effects of cardiac malformations on circulatory dynamics.

SUMMARY OF INFORMATION WHICH CAN BE OBTAINED

Oxygen content of blood from the chambers of the right heart, from the pulmonary artery and, with septal defects, from the chambers of the left heart.

Oxygen content of arterial blood, obtained by direct puncture of brachial or femoral arteries.

Oxygen consumption determined by spirometry or analysis of expired air.

From these data, cardiac output and the relative importance of shunts can be calculated according to the Fick principle.

Direct measurement of pressures in the chambers of the heart, in the great vessels, and in the peripheral arteries.

Demonstration of defects by passing catheter through them.

Arterial oxygen content may be determined by analysis or oximetry at rest, during exercise, or while breathing oxygen.

CATHETERIZATION IN CONGENITAL HEART DISEASE

In the presence of an auricular septal defect, blood flows from the left to the right auricle. The venous catheter is helpful in demonstrating arterial blood in the right auricle, or in passing through the septal defect.

In uncomplicated ventricular septal defect, arterial blood flows from the left to the right ventricle. Venous catheterization may serve to demonstrate an increased oxygenation of blood in the right ventricle as compared with that in the right auricle. Pressures in the right ventricle and in the pulmonary artery may be in excess of normal.

In the tetralogy of Fallot (pulmonary stenosis, interventricular septal defect, over-riding or dextroposition of the aorta, and right ventricular hypertrophy), some venous blood is shunted through the septal defect into the aorta. The venous catheter may pass through the stenotic pulmonary valve into the pulmonary artery, or may pass through the septal defect into the over-riding aorta. Pressure in the right ventricle is elevated; that in the pulmonary artery is usually low. Oxygenation of the peripheral blood is deficient due to admixing.

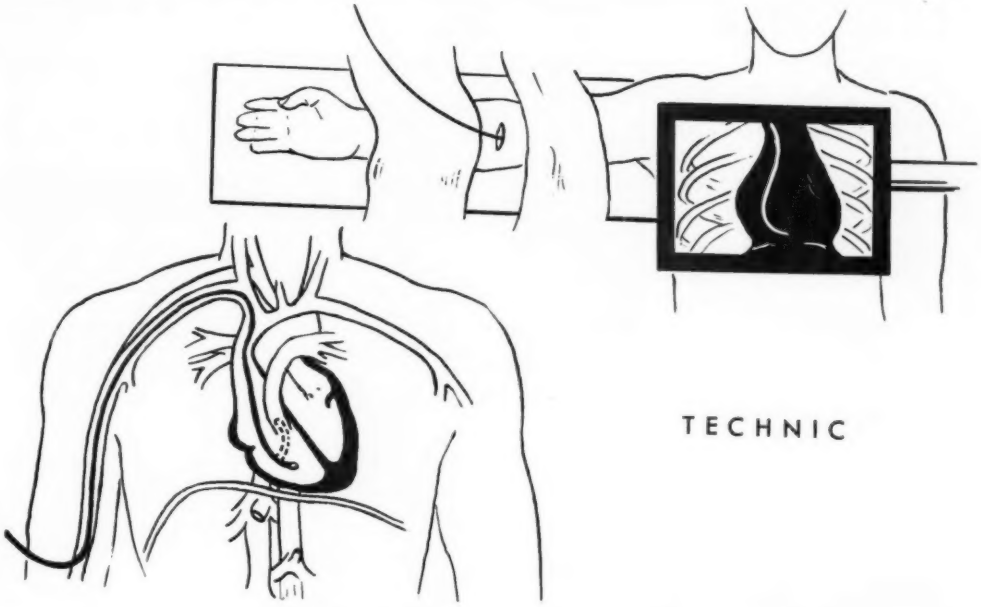
In the Eisenmenger complex, similar to the tetralogy except for absence of pulmonary stenosis, pressure in the pulmonary artery is elevated rather than reduced and entry into this artery is ordinarily not obstructed.

In patent ductus arteriosus, the flow of blood is from the aorta to the pulmonary artery. Venous catheterization demonstrates arterial blood in the pulmonary artery (oxygen content in pulmonary artery greater than that in right ventricle). Pressures in the right auricle, the right ventricle and the pulmonary artery are elevated.

In simple pulmonary stenosis, pressures in the right heart are increased, but that in the pulmonary artery is decreased. Entrance into the pulmonary artery is obstructed. Systemic and pulmonary blood flows are reduced equally.

CATHETERIZATION OF THE HEART IN CONGENITAL HEART DISEASE

Congenital Lesion	*Essential Feature of Defect*	*Pressures*		
		Right Auricle	Right Ventricle	Pulmonary Artery
Normal		5/0	25/0-2	25/8
Auricular septal defect	Blood flow, left to right auricle	Increased	Increased	Increased
Ventricular septal defect	Blood flow, left to right ventricle	Normal	Normal or increased	Normal or increased
Patent ductus arteriosus	Blood flow, aorta to pulmonary artery	Normal	Normal or increased	Normal or increased
Tetralogy of Fallot	Some venous blood shunted into aorta. Pulmonary artery constricted	Normal	Increased	Decreased, lower than right ventricle
Eisenmenger complex	Like tetralogy, but pulmonary artery not constricted	Normal	Increased	Increased
Pulmonary stenosis without septal defect	Pulmonary artery is constricted	Normal	Increased	Decreased



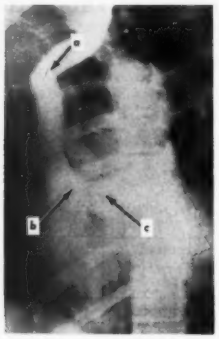
TECHNIC

Congenital Lesion	*Oxygen Content of Blood*			*Blood Flow*
	Right Auricle	Right Ventricle	Pulmonary Artery	
Normal	Equals vena cava*	Equals rt. auricle*	Equals rt. ventricle*	Systemic = Pulmonary artery = Pulmonary capillary
Auricular septal defect	Greater than vena cava	Equals rt. auricle	Equals rt. ventricle	Pulmonary artery flow may be greater or less than systemic flow
Ventricular septal defect	Normal	Greater than rt. auricle	Equals rt. ventricle	"
Patent ductus arteriosus	Normal	Greater than rt. auricle	Greater than rt. ventricle	Pulmonary capillary flow greater than pulmonary artery flow
Tetralogy of Fallot	Normal	Equal or greater than rt. auricle	Equals rt. ventricle	Systemic flow greater than pulmonary artery flow
Eisenmenger complex	Normal	Greater than rt. auricle	Equals rt. ventricle	Pulmonary artery flow may be greater or less than systemic flow
Pulmonary stenosis without septal defect	Normal	Equals rt. auricle	Equals rt. ventricle	Systemic and pulmonary artery flows reduced equally

**RA = RV = PA within 0.5 volume per cent.*

INTRAVENOUS CARDIOGRAMS

1. Right to left shunt. Tetralogy of Fallot.
a. Right heart (large, filled)
b. Pulmonary artery (small)
c. Left heart (small, empty)
d. Aorta (filled)



2. Diodrast from right to left. Auricular septal defect.
a. Superior vena cava
b. Right auricle
c. Left auricle

3. Left to right shunt. Patent ductus? Ventricular septal defect?
a. Right heart (empty)
b. Pulmonary artery (filled)
c. Left heart (filled)

RADIOLOGY—Comparative Value of Special Roentgen Technics in Congenital Heart Disease

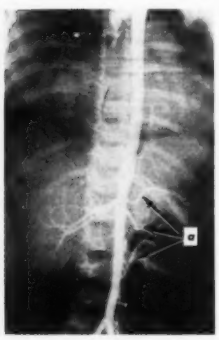
ACCORDING TO CONGENITAL DEFECT

Type of Defect	*Procedure of Critical Value*	*Procedure of Supplementary Value*
Right to Left Shunt	Intravenous Cardiography	Cardiac Catheterization
Left to Right Shunt	Cardiac Catheterization	Intravenous Cardiography
Patent Ductus Arteriosus	Retrograde Arteriography	Intravenous Cardiography
Coarctation of the Aorta	Retrograde Arteriography	

ACCORDING TO SPECIAL TECHNIC

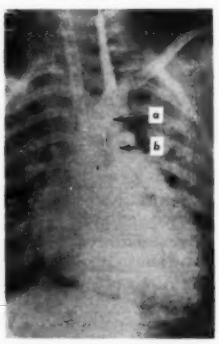
Roentgen Procedure	*Procedure of Critical Value In*	*Procedures of Supplementary Value In*
Fluoroscopy	None	Interauricular Septal Defect
Plain Film	Coarctation of the Aorta with Notched Ribs	Full-blown Tetralogy of Fallot
Intravenous Cardiography	Right to Left Shunt	Left to Right Shunt Patent Ductus Arteriosus
Retrograde Arteriography	Coarctation of the Aorta Patent Ductus Arteriosus	
Cardiac Catheterization	Left to Right Shunt	Right to Left Shunt

RETROGRADE AORTOGRAMS
(Injection into Carotid Artery)



4. Same case as 3, aortogram normal. No ductus, therefore interventricular septal defect.
a. Well filled abdominal vessels

5. Coarctation of the aorta.
a. Coarctation



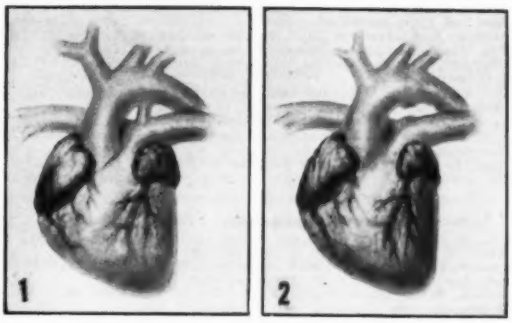
6. Patent ductus arteriosus.
a. Aorta (filled)
b. Pulmonary artery (filled)

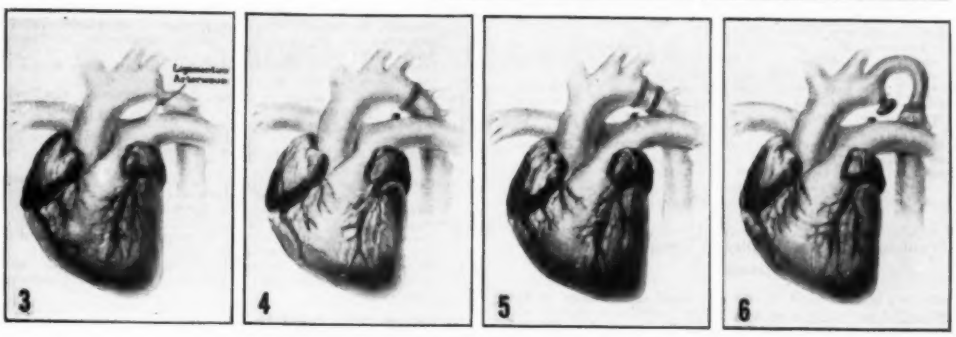
SURGERY OF CONGENITAL HEART LESIONS

Surgical intervention is often feasible in 4 types of congenital heart lesions. These lesions are often complicated by additional congenital cardiovascular anomalies which may modify or even contraindicate a surgical approach. Valvulotomy and certain other surgical procedures are also becoming widely applicable clinically.

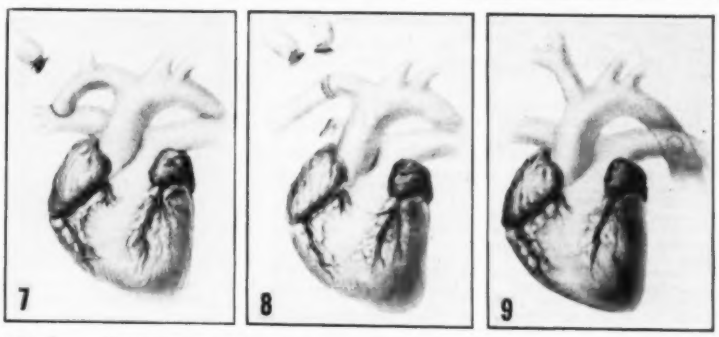
PATENT DUCTUS ARTERIOSUS (1) may be ligated, or divided and sutured (2).

COARCTATION OF THE AORTA (3) may be excised and the cut ends of the aorta anastomosed (4), or a graft inserted (5). The aorta may be divided and the distal portion anastomosed to the left subclavian artery (Blalock) (6).





TETRALOGY OF FALLOT and other congenital anomalies where cyanosis is due largely to pulmonary artery obstruction (truncus arteriosus, tricuspid atresia with nonfunctioning right ventricle, pulmonary stenosis with septal defect), can be provided with a fairly large shunt from the aorta or one of its branches to the pulmonary artery (7, 8 and 9).



VASCULAR RING ANOMALIES, especially anomalous aortic arches (double arch, persistent right arch), may produce constricting rings around the trachea and esophagus (11 and 12). Since these anomalies vary widely, no standard operative procedure can be used in all. (10 shows normal relations between heart and great vessels.) The principle of surgery is to sever the vessel which can be sacrificed most safely.

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MAREY'S SPHYGMOGRAPH
(To measure blood pressure)

GENERAL PRACTICE *Review*

To provide the general practitioner as well as the specialist with concise, readily available information on the latest, proved methods of treatment of conditions commonly encountered in an average practice, POSTGRADUATE MEDICINE *offers this department to its readers. It is not, of course, intended to present these discussions as the only acceptable therapeutic procedures to be used, but rather to offer simple regimens and recommendations based on the extensive experience of the physicians who prepared these summaries.*

Selection of Patients for "Elective" Cholecystectomy

STANLEY O. HOERR

CLEVELAND CLINIC AND THE FRANK E. BUNTS EDUCATIONAL INSTITUTE, CLEVELAND

HOERR

CHOLECYSTOGRAPHY is employed routinely by many physicians in the survey of every patient with gastrointestinal symptoms. Furthermore, it is employed frequently for disorders where a general checkup is deemed advisable. As a result, disease of the gallbladder is being diagnosed with increasing frequency and accuracy; nevertheless, despite an encouragingly low mortality rate for elective cholecystectomy (with many surgeons less than 1 per cent), patients continue to be disappointed in the end result of the operation.

The physician will achieve the best results by observing several fundamental principles in the selection of patients for cholecystectomy:

1. Gallstones should be present in the vast majority of instances.

2. Biliary colic is the only symptom for which complete relief is relatively certain.

3. If cholecystectomy is undertaken primarily to prevent possible future suffering rather than to alleviate present symptoms ("prophylactic" cholecystectomy), this fact should be carefully explained to the patient before operation.

GALLSTONES

Few indications exist for the removal of the stoneless gallbladder. The most frequent is the occasional case of acute cholecystitis without stones; a rare indication is the presence of a papilloma or polyp demonstrated by the cholecystogram. Physician and patient alike will be disappointed in the end result when the principal reason for removing the gallbladder has consisted of such debatable abnormalities in the cholecystogram as "poor filling," "delayed emptying" or a peculiar shape of the gallbladder without evidence of stones.

The presence of gallstones may be determined in three ways:

1. *By a simple x-ray of the gallbladder area*—About 20 per cent of all gallstones contain sufficient calcium to cast a characteristic radiopaque shadow. This may be demonstrated on an ordinary KUB x-ray film of the abdomen, or more reliably by a postero-anterior view of the gallbladder area.

2. *By cholecystography*—When the gallbladder is capable of concentrating the dye, the radiolucent shadows of gallstones usually are detected with ease. Gas shadows in bowel overlying the gallbladder are occasional sources of confusion, but these may

be eliminated largely by a decubitus film taken of the region with the patient lying on his right side. Such a special view occasionally will demonstrate a "stone level" as well, which is helpful in interpretation.

3. *By clinical inference*—If a patient has had typical biliary colic, and the gallbladder does not visualize with the double dose technic, the presence of gallstones may be assumed.

SYMPTOMS

The best results following cholecystectomy have been observed in those patients who have suffered from severe biliary colic. Permanent relief from the attacks generally follows. Any attack which has required the administration of narcotics for relief of pain may be regarded as severe. The classical syndrome is that of a fairly abrupt onset of pain, usually in the epigastrium or beneath the right costal margin, often radiating to the tip of the right scapula or to the interscapular region. The pain may be intermittent or persistent, and may subside abruptly in a period of minutes or gradually over several hours.

An attack may occur at any time. It frequently takes place at night, after a heavy meal, waking the patient from sleep. If an attack lasts longer than a few hours, acute cholecystitis is to be suspected. Variations on this basic theme are common, and occasionally the pain may be predominantly in the back, the substernal region, or the left upper quadrant. If the colic is bizarre in its location, it may be necessary to rule out other possible causes such as coronary artery disease or disease of the urinary tract.

A variety of less dramatic symptoms is ascribed to the diseased gallbladder. "Gas," "bloating," and epigastric fullness, especially when precipitated by ingestion of cooked animal fats, cabbage, raw apples and onions, are examples. Undoubtedly the gallbladder may be responsible for any of these complaints, but unfortunately they also occur in the irritable colon syndrome, in allergies arising from foods, duodenal ulcer, gastric cancer and the so-called gastric neuroses (based on chronic anxiety states). When any one of the latter group of symptoms is the only complaint of the patient with gallstones, the cautious physician will observe two precautionary measures: (1) he will conduct a careful survey to exclude the presence of other disease, which usually includes a roentgenologic examination of the entire gastrointestinal tract; (2) if cholecystectomy is to be performed, he will warn the patient that any or all of his symptoms may persist after operation.

THE NONFUNCTIONING GALLBLADDER

If the gallbladder fails to concentrate dye in routine cholecystography, the physician should satisfy himself concerning the following points:

1. That the patient actually took the dye.
2. That the patient did not vomit the dye.
3. That the patient does not have gastric retention without vomiting.
4. That the patient did not have an attack of severe diarrhea.

An accurate test depends upon the dye being normally absorbed from the gastrointestinal tract, and failure to consider the points outlined may result in an error in the interpretation of the x-ray films. Even if the test appears to have been valid, most radiologists prefer to repeat it the following day if the gallbladder fails to visualize. If the gallbladder does not concentrate sufficient dye to cast a shadow after such a double dose or "reinforced" test, the presence of a pathologic gallbladder may be assumed. An exception is to be found in the patient with severe liver disease (such as hepatitis with jaundice), in whom the gallbladder may be normal but the liver is incapable of excreting the dye. Cholecystography is of no value in differentiating between obstructive and hepatogenic jaundice, and the test is usually contraindicated.

The fact that the gallbladder is nonfunctioning by cholecystography is not in itself an indication for surgery. If the physician is satisfied that the patient has had biliary colic, cholecystectomy may be recommended with good assurance that stones are present and that the symptoms will be relieved. In the absence of colic, the careful survey already described should be performed; if no other reason for the symptoms can be found, the patient must be warned that he cannot expect dramatic symptomatic improvement following cholecystectomy.

In many instances postponement of surgery is advisable until an attack of typical colic occurs. A repetition of the cholecystogram at some future date is sometimes helpful, and occasionally a gallbladder which fails to function normally during one examination will be found to concentrate the dye at subsequent examinations. This often has been found to be the case with the irritable colon syndrome after the patient has followed a regimen for bowel management. Patients must be individualized, and the physician should be circumspect in his predictions to the patient.

ASYMPTOMATIC GALLSTONES

Gallstones are discovered unexpectedly in an occasional patient who has no symptoms referable to the gallbladder. Although no constant rules may be advanced, it is not usually necessary to urge an operation. The age of the patient will influence the advice given. In general, the younger the patient, the stronger the case for a prophylactic cholecystectomy. The patient in his twenties or thirties has a longer time ahead of him in which to develop

symptoms than the older patient, and his chances of experiencing difficulties from his gallstones are correspondingly greater.

In older patients it is often wise to advise indefinite postponement of cholecystectomy. Physician and patient will be aware of the presence of gallstones and able to take advantage of prompt surgical intervention should symptoms appear, thus precluding the development of the dangerous complications—acute cholecystitis and common duct stones. The increasing safety of operation upon elderly patients justifies such a postponement. A delay in surgery on a patient in his fifties, for example, may result in an operation when he is in his seventies; this, however, does not appear to involve a proportionate increase in risk, providing the possible complications already alluded to are not permitted to develop. A single attack of colic in a patient with recognized gallstones should be sufficient indication for a prompt operation.

EFFECT OF ASSOCIATED DISEASE

Certain diseases which may coexist with gallstones appear to be benefited by cholecystectomy. The association of recurrent pancreatitis constitutes one example, and cholecystectomy usually is indicated irrespective of the degree of biliary symptomatology. A duodenal ulcer also is affected adversely by a diseased gallbladder, and management of a patient having both these conditions often is simplified following removal of the gallbladder. The same is true of the patient with gallstones and the irritable colon syndrome. Conversely, accumulated experience has failed to justify the hope that the removal of the diseased gallbladder as a "focus of infection" would prove beneficial in such ailments as chronic arthritis.

Much has been written in recent years about the adverse effect of gallstones upon coronary artery disease. The best view at present seems to be the one which urges cholecystectomy for patients with heart disease for the same general indications utilized for other patients. In other words, the patient with coronary artery disease should have the appropriate surgery for gallstones with colic, for acute cholecystitis, or for common duct stone, even if the heart disease is severe and has included previous coronary thromboses or congestive failure. These cardiac patients tolerate biliary surgery surprisingly well, and the heart disease often appears to improve following appropriate surgery on the biliary tract. On the other hand, asymptomatic gallstones in these patients are best left undisturbed.

CONCLUSION

Elective cholecystectomy is comparatively safe, yet the symptomatic results are often disappointing. Some simple rules have been presented designed to aid the physician in reducing these unsatisfactory results to a minimum.

Treatment of Acute Barbiturate Poisoning by Nonconvulsive Electrostimulation

THEODORE R. ROBIE

EAST ORANGE, NEW JERSEY

It is consoling to know that the suicide rate has been reduced considerably in recent years. The introduction of electroshock therapy for melancholia 10 years ago has played a major role in the 25 per cent reduction in the annual number of suicides.[1] Nevertheless one reads all too frequently in the newspapers items such as this: "Victim Dies From Self-Administered Overdose Of Sleeping Pills."

Although deaths by suicide are less frequent, they still amount to 11.5 per 100,000, and it is an alarming fact that the proportion of suicidal deaths caused by barbiturate overdosage is not merely on the increase but that the increase has reached astounding proportions. Consider these data: Over a seven-year span, the number of deaths caused by barbiturates in New York City increased more than 375 per cent! In Los Angeles a 670 per cent increase in barbiturate deaths occurred over a span of only three years! In the Chicago area (Cook County) the statistics are even more disturbing with a 1,300 per cent increase over an eight-year span! Similar alarming statistics can be secured from other cities. Yet these statistics do not show how serious the situation actually is, since both insurance men and physicians[2] recognize that many

The photograph shows administration of cerebral electrostimulation. Note that the oxygen apparatus is immediately available.

deaths are reported as due to some other cause, when the actual cause was barbiturate overdosage taken with suicidal intent.

These statistics show most emphatically that we need to have more state laws (such as the New Jersey Law) which prohibit the sale of barbiturates except on physician's prescription. At the same time a more reliable method has been needed for the resuscitation of persons who have taken overdoses of these coma-producing drugs. While picrotoxin, amphetamine and other drugs have revived some, it is well known that these chemical methods fail in a considerable proportion of cases and that the complications arising when these methods are used (pneumonia, anuria, etc.) are exceedingly difficult to combat.

After observing unidirectional electrocerebral stimulation[3] used in treating certain psychiatric disorders, I suggested its use for resuscitating persons found in coma caused by barbiturate overdosage. This very simple procedure has proved even more efficacious than we had hoped.

A large proportion of the cases of barbiturate poisoning treated have been successfully resuscitated by this simple method, which should rapidly come into widespread use in the opinion of a panel of psychiatrists* who have collaborated in pooling their case material. We believe comatose persons who have ingested overdoses of 15 to 35 gr. can be wakened in one-half hour to two hours of stimulation and from overdoses of 35 to 50 gr. in three to five hours. While this latter dosage usually is lethal, if stimulation is started reasonably early there is a very good chance of recovery. We have already established the fact that recovery is possible from even larger dosages, but such good fortune is naturally dependent on beginning treatment early and with the realization that it may take 8 to 10 or more hours to bring about a return to partial consciousness and 24 or 48 hours may elapse before complete contact with reality is fully re-established.

I shall cite only two cases:

Case 1—A woman of 63, found in deep coma, treated as diabetic coma for 48 hours because initial blood sugar was elevated. However, when blood sugar became normal and patient was still unconscious, and family reported that her supply of "sleeping pills" was missing, electrostimulation was suggested. This wakened the patient in a very short time and she admitted taking 18 gr. of SECONAL with suicidal intent. The marked melancholia existent at once became obvious from her emphatic protestations against the doctor for waking her from the "permanent" sleep she sought. However, a course of electroshock therapy returned her to a normal mental state in the next few weeks.

Case 2—A woman of 45, discovered in coma, was thought to have taken a quantity of barbiturate capsules in addition to copious amounts of alcohol. An hour afterward she was not rousable, and two hours afterward breathing was extremely shallow, steadily increasing cyanosis was obvious, and pupils were pinpoint, without reaction to light. The prognosis was obviously poor. Yet electrostimulation induced a return to partial consciousness in five minutes and in seven

*Robie, Theodore R., M.D., East Orange, N. J.
Furst, William, M.D., Newark, N. J.
Reznikoff, Leon, M.D., Secaucus, N. J.
Ross, Ira, M.D., Newark, N. J.
Hirschfeld, Gerhard, M.D., Lyons, N. J.
Reiter, Reuben, Sc.D., New York
Friedman, Emerick, M.D., Albany, N. Y.
Impastato, David, M.D., New York
Lotesta, Pasquale, M.D., Brooklyn, N. Y.
Bennett, Robert J., M.D., Trenton, N. J.
Colley, Arthur, M.D., Plainfield, N. J.
Wilcox, Paul, M.D., Traverse City, Mich.

minutes she talked intelligibly, and admitted taking 18 gr. of NEMBUTAL approximately three hours before being wakened by electrostimulation.

These two cases with identical dosage, but different forms of barbiturate, show clearly the advantage of early diagnosis. The second patient could have died, with her deepening coma, cyanosis and other evidences pointing to termination. Yet she was resuscitated very quickly. In the first case the 48-hour vigil over a comatose patient might have been shortened and the poor prognosis quickly changed. However, since this was really our first case, it is not strange that there was no rush to try an untried instrumentality. But now, we have already determined that persons who have ingested much larger dosage can be resuscitated by this method.

PROCEDURE

The procedure is simple. Electrodes moistened with soda bicarbonate solution are attached to both temples by a wide rubber band. The Reiter C47 Electrostimulator* is used with gauges as follows:

(a) Modulation low in beginning, but raised or lowered as necessary, to enhance respiratory rate and amplitude. The effect with low modulation when treatment is started, even when patient appears in extremis, is to replace shallow weak respirations by slow deeper excursions, an advantageous factor not produced by any of the chemotherapeutic methods; (b) dosage of 5 to 7 milliamperes to begin with, gradually lowered should respirations become too labored.

Clinically the patient shows increased amplitude of breathing on this regimen, but the coma may be unaffected in the beginning and therefore suction must be used to keep air passages clear of salivary accumulations, and an airway should be introduced. Benzedrine intravenously may be used as supplementary medication—this will raise blood pressure when it becomes precariously low. Saline may be given to hasten more rapid elimination of the barbiturate by diluting the body fluids, but this measure may add to the fluid accumulations in the throat, unless the amount administered is carefully controlled.

If prolonged treatment is required, a one to three minute rest from stimulation may be ordered, every half hour. The milliampere dosage may be varied from 2 to 3 or up to 5 as seems required to maintain optimal respiratory amplitude. By a simple attachment to the car battery, model VA 47 can easily be adapted for use in the ambulance, preventing any loss of time in initiating treatment, once a patient is discovered in barbiturate coma. The operator can acquire the technic very quickly.

However, for those a bit squeamish about trying it without observing others use it, this method of learning is always available: Any patient receiving electroshock therapy (with the Reiter Apparatus) can be administered PENTOTHAL SODIUM intravenously in moderate dosage (perhaps 3 to 5 gr.). The injection is given slowly until coma is induced. Then the patient is administered electrostimulation as described before and in one to three or four minutes he will begin to squirm about. The stimulation is then stopped and the patient will talk immediately. It is obvious that the stimulation has wakened him because pentothal-produced coma may endure from one to three hours, even with minimal dosage of the drug, unless this wakening technic is used. Since we give minimal dosage of pentothal routinely today, to all patients receiving electroconvulsive treatment, it will be obvious that the above treatment will be harmless. In any case it differs only slightly from the routine method of administering nonconvulsive electrostimulation, used today as a therapeutic measure in certain psychiatric disorders.

Persons who have ingested larger doses of barbiturates may require two to four—or even, in extreme cases, six to eight hours of stimulation before they are fully resuscitated.

COMMENT

While this paper was in preparation a new chemotherapeutic method for resuscitating cases of barbiturate poisoning appeared in the July 8, 1950, issue of the *Journal* of the American Medical Association. Pointing out that their method is superior to picrotoxin or BENZEDRINE intravenously, Jones, Dooley and Murphy† urge METRAZOL in large doses intravenously as the treatment of choice.

After careful study of their report, I am convinced that electrostimulation has very distinct advantages over their method because (1) it brings about quicker recovery (even in their moderate overdosage cases it was 24 hours before consciousness returned, while we can anticipate recovery usually in one or two hours in such cases) and (2) with quicker recovery the danger of complications is decreased (they report 3 deaths due to the secondary complications after consciousness had been restored). But, since these authors feel it is much safer to use than picrotoxin, we should consider the advantages of metrazol as an adjunct to the electric methods to enhance more rapid recovery. We should remember, however, that since metrazol is convulsive to nonbarbiturate-drugged persons, much smaller doses would be indicated since the mild electrostimulation might induce the complication of a convulsion because even the very small dosage of electricity used for stimulatory

*Apparatus made by Reuben Reiter, Sc.D., New York City.

†Jones, A. Warren, Dooley, James, and Murphy, John R.: Treatment of choice in barbiturate poisoning; series of 29 cases of barbiturate poisoning treated with pentylenetetrazole (Metrazol) and supportive therapy. J.A.M.A. 143:884-888 (July 8) 1950.

purposes might conceivably induce a convulsion and thus place an unnecessary strain on a person in drug coma—a proceeding that should certainly be avoided.

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Treatment of Barbiturate Addiction

HARRIS ISBELL*

U. S. PUBLIC HEALTH SERVICE HOSPITAL, LEXINGTON, KENTUCKY

ISBELL

Chronic intoxication with barbiturates, like chronic intoxication with morphine, is a true addiction and sudden withdrawal of barbiturates from persons who have been ingesting large amounts of these drugs for long periods of time results in the appearance of convulsions of grand mal type and of a psychosis which resembles alcoholic delirium tremens.[2-4] Although the barbiturate abstinence syndrome is a self-limited condition which has no permanent physical sequelae,[1,2,4] patients may incur serious injuries during either the convulsive or psychotic phases of withdrawal. Proper treatment of barbiturate addiction is, therefore, a matter of considerable importance.

The minimal dosages and the minimal length of time over which barbiturates must be ingested before signs of abstinence occur after abrupt withdrawal have not been exactly established. Except in cases of epilepsy, abrupt withdrawal of barbiturates from persons who have been taking 0.1 to 0.2 gm. of barbiturates over any period of time is not followed by untoward symptoms of any consequence. Sudden withdrawal of barbiturates from epileptics who have been accustomed to the use of 0.1 to 0.3 gm. of pentobarbital daily is likely to precipitate status epilepticus.[5,6]

Clinical experience indicates that abrupt withdrawal of barbiturates from persons who have been using 0.8 gm. or more of any barbiturate daily for as long as two months is very likely to be followed by the appearance of convulsions or a psychosis, or both. Individuals who have been ingesting 0.3 to 0.7 gm. of barbiturates daily may or may not have symptoms following abrupt withdrawal. In such borderline cases, it is wise to proceed cautiously and to avoid the sudden cessation of barbiturate medication.

The treatment of barbiturate addiction, like that of other addictions, can be divided, for purposes of discussion, into withdrawal and rehabilitative phases.

WITHDRAWAL OF BARBITURATES

Withdrawal of barbiturates should always be carried out in a hospital. Like morphine addicts, barbiturate addicts are very clever in obtaining and concealing supplies of drugs; therefore, attempts at withdrawal in the home will usually fail. Moreover, even gradual reduction of barbiturates carries a certain risk so that patients should be under constant supervision and observation during treatment. Patients should be kept in beds with sideboards to prevent them from falling to the floor, in the event convulsions develop, and they should not attempt to walk about unattended. As mentioned later in this discussion, electroencephalographic control is very desirable.

Abrupt withdrawal of barbiturates from addicted persons is contraindicated. Even sudden reduction in the dosage the patient is accustomed to taking may result in the appearance of signs of abstinence. When treatment is begun, the patient should be given an amount of one of the potent short-acting barbiturates sufficient to maintain a mild degree of barbiturate intoxication constantly. This is called

*From the National Institute of Mental Health of the National Institutes of Health, Public Health Service (Research Division, U. S. Public Health Service Hospital, Lexington, Kentucky).

the "stabilization dosage." In the average case, 0.2 to 0.4 gm. of pentobarbital every six hours will suffice for this purpose. The dosage of barbiturates should be determined by the signs of the intoxication and not by the patient's history. If the patient shows transient nystagmus on lateral gaze, slight dysarthria, and swaying (but not falling) on the Romberg test, the degree of intoxication is sufficient to prevent the appearance of manifestations of abstinence. If nystagmus is present constantly, dysarthria is marked, and if the Romberg test cannot be performed without falling, the dosage of barbiturates is too great and should be reduced.

After the stabilization dosage has been determined, barbiturates should be gradually withdrawn. The total daily dosage should not be reduced more than 0.1 gm. per day. When the amount of drug has been reduced to about 50 per cent of the stabilization dosage, the reduction should be stopped and the patient maintained at this level for two or three days, after which reduction is begun again. When a level of 25 per cent of the stabilization dose is reached, reduction is stopped for two or three days and then begun again. Usually two to three weeks are required before the withdrawal is completed.

If excessive anxiety, insomnia or tremor appears during withdrawal of barbiturates, reduction of the dosage should be stopped and the amount of drug held constant until these symptoms disappear. It is frequently difficult to determine whether such symptoms are manifestations of abstinence from barbiturates or represent phenomena due to the psychiatric disorder which led to the addiction. In the latter case, the symptoms usually are mitigated by strong reassurance.

Patients who are being withdrawn from barbiturates should have electroencephalograms made as frequently as possible, and electroencephalograms should always be obtained if insomnia, anxiety and tremor are present. The appearance of bursts of high voltage slow waves[2] usually precedes the onset of grand mal seizures. If this electroencephalographic pattern is observed during treatment, an extra dose of pentobarbital should be given immediately and reduction of the dosage stopped until the high voltage slow waves have disappeared.

It is important to remember that acute barbiturate intoxication is frequently superimposed on barbiturate addiction. After patients who have been acutely poisoned with barbiturates have recovered from coma, it should be ascertained whether they have been taking the drugs chronically. In such cases, barbiturate intake should be restored and gradual reduction begun as outlined.

If the diagnosis of barbiturate addiction is made after the major manifestations of convulsions and/or a psychosis have appeared, barbiturates should be given at once. Sodium pentobarbital, 0.5 gm. intravenously, will usually terminate the convulsions. The patient can then be placed on a regular schedule of orally administered barbiturates. The psychosis usually, but not always, clears up a day or so after barbiturate intake is restored. Withdrawal can then be carried out gradually.

If the method of slow withdrawal is used, very little adjunctive therapy is required other than the provision of adequate supervision and protection of the patient. Proper attention to any coexisting organic disease is, of course, essential. In cases of mixed addiction to both barbiturates and alcohol, intensive dietary and vitamin therapy may be required. Withdrawal of morphine can be carried on concomitant with withdrawal of barbiturates without increasing the danger of convulsions or psychoses.

REHABILITATIVE THERAPY

Withdrawal of barbiturates is only the first step in treatment. Unless withdrawal is followed by an intensive period of rehabilitative therapy, the patient will almost certainly relapse to the use of barbiturates or some other drug. The average length of time that a patient should remain under treatment has not been established and will probably vary greatly in the individual case. So far as can be ascertained by clinical and psychologic examinations, *physical recovery* from the effects of addiction to and withdrawal from barbiturates is complete in 30 to 60 days.[2] Patients should remain under treatment for some time after regaining physical normality. Four to six months probably represent the minimum time for adequate rehabilitative therapy to be carried out.

After withdrawal is completed, any organic disease which the patient may have should be treated appropriately. If the patient is suffering with a chronic disease which is not completely curable, treatment should be designed to bring about the greatest possible physical improvement and to teach the patient to manage his disease without resorting to the chemical crutch of the barbiturates or other drugs. In cases in which intractable pain plays a role in the genesis of the addiction, appropriate neurosurgical procedures—sympathectomy, rhizotomy, chordotomy, lobotomy—should be considered.

During the rehabilitative phase of treatment, patients should never be allowed to remain idle. They should be given the opportunity to engage in useful, productive and interesting work rather than having to spend their time in weaving rugs and other such forms of occupational therapy. Whenever possible, the types of work prescribed should maintain or add to the skills which the patients possess, thereby enabling them to earn a livelihood after discharge. Patients with chronic disease

should, within the limits imposed by their disabilities, work at some useful occupation.

Adequate recreation must be provided. This program should include games of various sorts, athletics, various amusements (movies, music, lectures), and an ample supply of reading material.

PSYCHOTHERAPY

In any individual case, one must first decide whether psychotherapy should be offered at all. Like morphine addicts, many barbiturate addicts have intense infantile fixations and obtain very little benefit from psychotherapy. In such instances it is best to provide only a short period of close supervision, followed by a long period of close supervision in the patient's home environment. Patients who have reached a greater level of emotional maturity prior to addiction should be offered intensive psychotherapy. The form which the therapy will take will depend on the patient's problems and on the personality, attitude, training and orientation of the therapist. It does not differ in any way from the psychotherapy of neurotic patients who have never been addicted to drugs.

Since barbiturate addiction and alcoholism are similar problems, all patients should be encouraged to participate in the activities of Alcoholics Anonymous groups. Many patients appear to derive great benefit from this organization, which also provides help and encouragement to remain abstinent after discharge from the hospital.

Before a patient leaves the hospital, definite arrangements should be made for continuing supervision and treatment. The resources of an efficient social service department are invaluable in making such plans.

SUMMARY

Chronic barbiturate intoxication is a true addiction. Sudden withdrawal of barbiturates, or even sudden reduction in the dosage the patient is accustomed to taking, may be followed by convulsions, a delirium, or both.

Careful, gradual reduction in the dosage of barbiturates over a period of two to three weeks is the best method of withdrawing these drugs from addicted persons.

Withdrawal of barbiturates should be followed by a long period of rehabilitative therapy, including psychotherapy when indicated.

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Treatment of Deep Fungous Infections

LESLIE M. SMITH

EL PASO, TEXAS

SMITH

For many years iodine, either in the form of saturated solution of potassium iodide or of Lugol's solution, headed the list of remedies proposed for the treatment of the deep mycotic infections. Although at times the use of these preparations was attended by benefit, they were most often disappointing in all the members of this group except sporotrichosis, in which they still are the treatment of choice and are curative in the majority of cases in a comparatively short time.

With the exception of penicillin, streptomycin, and the sulfonamides in actinomycosis, the newer drugs have given us no help in these diseases. Prodigiosin and eumycin are being used experimentally by some investigators, but it is too early to evaluate these preparations. It is hoped that these or some other and newer antibiotics may be found which will be effective in at least some of the deep mycoses. Colloidal iodine, colloidal copper, antimony and potassium tartrate and other antimony preparations have all been used with apparent benefit in some cases. The multiplicity of remedies used indicates that there is as yet no dependable treatment for these diseases as a group.

Sporotrichosis usually responds to a few weeks of iodine therapy and, while x-ray therapy has often been used as an adjunct, it is seldom necessary. Potassium iodide or Lugol's solution by mouth, increasing to the point of tolerance, or sodium iodide intravenously, will cure the great majority of cases. In cases which are intolerant to iodine there is at present no comparable remedy. Lewis[1] recommends trial of thymol in these cases.

Unfortunately the treatment of blastomycosis is not nearly so satisfactory as that of sporotrichosis. Small localized lesions should be destroyed by electrocoagulation or actual cautery, or treated with wet dressings of potassium iodide solution or diluted Lugol's solution. I believe a trial of daily applications of 20 per cent podophyllin in mineral oil, alcohol, or compound tincture of benzoin would be justified in these lesions, in view of the pseudo-epitheliomatous character of the tissue, although I have not had occasion to use it. It is of benefit in similar nonmycotic granulomatous lesions. Potassium iodide has long been the favored treatment, along with intensive or subintensive x-ray therapy. The Duke University group[2] recommends that patients be tested for hypersensitivity to blastomycin, and that those found strongly hypersensitive be given hyposensitizing treatment for two weeks before iodides are begun. Thymol given in capsules, 1 to 6 gm. daily, is sometimes of benefit in blastomycosis.

Patients with acute pulmonary coccidioidomycosis almost all recover spontaneously, but for the chronic coccidioidal granuloma there is no dependable treatment. Small localized lesions may be destroyed by cautery or electrocoagulation. Superficial lesions of the verrucous type are improved by wet dressings of iodide solutions as used in blastomycosis. Subcutaneous sinuses can often be made to heal by repeated injections of 10 per cent copper sulfate solution or tincture of iodine, or by opening the entire length of the sinus tract and applying pure phenol, the effects probably being due to the sclerosing action of the drugs. Potassium iodide orally, colloidal iodine, colloidal copper, antimony and potassium tartrate along with x-ray therapy have all been used with apparent success in certain cases, but certainly they are not consistently curative; and the fact that the disease is subject to remissions makes it difficult to evaluate any treatment. Cox and Dickson[3] recommend thymol, 1 to 6 gm. daily in olive oil given in capsules, and the local application of 33.3 per cent thymol in olive oil to the lesions. Jacobson[4] uses specific vaccinotherapy, although it has been disappointing in the hands of other investigators.

Formerly potassium iodide was the treatment of choice in actinomycosis, but since the advent of the sulfonamides, penicillin, and streptomycin, it has been largely replaced by these newer drugs. Most cases are being treated now with either penicillin or sulfadiazine, or both. Lamb[5] and his co-workers used sulfadiazine over a period of several weeks to two months or more, giving injections of liver extract coincidentally. They feel that the administration of liver greatly diminishes the danger of toxic symptoms from the sulfonamide, and since large amounts of sulfadiazine are necessary this seems a wise precaution. From 6 to 8 gm. of sulfadiazine should be given daily at first, gradually reducing the dosage as the disease improves.

Penicillin is effective in many cases of actinomycosis, but should be given in large doses, and for several weeks. Gonzales Ochoa[6] in Mexico City recommends the combined use of sulfadiazine and potassium iodide in infections due to the various aerobic organisms, and penicillin in those cases caused by the anaerobe, *A. bovis*. Latapi and Arnold[7] have successfully used DIASONE, but Gonzales Ochoa feels that sulfadiazine is more effective than the sulfones.

It is often wise to remove surgically residual foci of actinomycosis, especially in bone, after the disease has subsided under sulfonamide or penicillin therapy. Lamb recommends that 150 r. of x-ray be given cutaneous lesions on alternate days for a total of 1,500 to 2,200 r., using adequate filtration. With modern treatment many more cases of actinomycosis are being cured than with the older treatment by potassium iodide and x-ray.

Histoplasmosis, systemic infections with Monilia, and torulosis have as yet no dependable treatment. Histoplasmosis has apparently been benefited by various forms of antimony, particularly FUADIN and NEOSTAM, and by the sulfonamides.

This article has been a summary of present day treatment of the deep mycoses, without attempting to add anything new and original. The treatment of this group of diseases leaves much to be desired. Those of us who are interested in mycology look forward to the possible discovery of some new antibiotic which will add to our therapeutic armamentarium. Until then, it may be said that only in sporotrichosis and actinomycosis do we have even reasonably adequate methods of treatment.

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Pediatrics

IN GENERAL PRACTICE

For general practitioners, in whose practice is included a major proportion of the medical management of infants and children, and for the specializing pediatrician as well, POSTGRADUATE MEDICINE *presents this special regular department devoted to brief discussions by recognized authorities on their preferred methods of the treatment and management of diseases and problems of infancy and childhood.*

Etiology of Behavior Disorders in Children

HARRY BAKWIN*

NEW YORK UNIVERSITY-BELLEVUE MEDICAL CENTER, NEW YORK

BAKWIN

There is a current tendency to attribute the behavior problems of children primarily to parental mismanagement. This attitude is justified in many instances but it is by no means generally true. In fact, probably the majority of severe behavior problems arise in other ways.[1]

The etiology of behavior disorders is usually multiple. A child with minor behavioral changes, on the basis of anoxic damage to the brain at birth, may function adequately in a good home, whereas another child, no more severely afflicted, will be a troublesome problem in a tense home.

An important point to keep in mind in assessing the etiology of a behavior disorder is that a mechanism which seems obvious may actually be of secondary importance. Rejection is a frequent overt reaction in the mothers of children with schizophrenia. The children are difficult to manage, they are unresponsive to affection, they create disturbances in the home and neighborhood and so on. Yet, obviously, it would be a mistake to attribute the child's difficulties to maternal rejection.

A prominent consideration in every diagnostic situation is the child's own constitutional makeup. Since all biologic attributes vary, it follows that the emotional endowment will also vary. A trifling situation may upset a sensitive child whereas the majority of children would remain unaffected under the same circumstances; and, on the other hand, certain children, subjected to what is generally considered a highly traumatic situation, may remain unaffected by it.

Some of the most difficult and, at the same time, most common problems in everyday pediatric practice center about the differentiation between what is "normal" and what is "abnormal." Are the legs physiologically or pathologically bowed? Are the feet flat? Are the tonsils diseased or simply large? Is the wrist swelling normal or rachitic? In the same way, many so-called behavior problems are actually physiologic variants. Childhood habits such as finger-sucking, rhythmic body movements, and masturbation are now widely regarded as normal activities. Only when these practices are indulged in to excess, or when they are continued beyond the developmental phase to which they belong, may they be regarded as behavior problems. However, the mother, because she is uninformed or for other reasons, may find these habits unacceptable to her and dwell on them unduly, in this way

*Department of Pediatrics, College of Medicine, New York University-Bellevue Medical Center, New York.

creating a situation which requires therapy. Moreover, a thumb-sucker may infect his thumb or a bed-rocker may disturb the family and neighbors.

Is the child who refuses to eat what the mother thinks is good for him a problem? The mother here either fails to understand the dietary needs of her child or is unwilling or unable to accept the situation. Primarily the child's eating is not a problem, but parental pressure and tension may create one. In the same way, failure to appreciate the wide variability in the sleeping needs of different children may be the basis of a problem. What about the boy who runs away from home to seek adventure or to make his fortune?

The symptoms which a disturbed child shows are generally nonspecific as in the case of organic disorders, e.g., fever, headache, abdominal pain, and so on. The child expresses his emotional discomfort largely according to the developmental phase in which he happens to be. To a great extent, regardless of the cause, the unhappy baby cries, the disturbed preschool child is negativistic and/or aggressive, the maladjusted school child does poor work or is a truant, the emotionally upset adolescent gets into sex difficulty or becomes a communist.

DIAGNOSTIC APPROACH

The diagnostic approach to a behavior disorder in a child is similar to that to a physical disorder. The history should contain details of the chief complaint and of associated complaints. One will generally want to know, also, about the interfamilial relationships. Careful note should be made of conditions which may be associated with injury to the central nervous system such as abnormal birth, encephalitis, an early attack of pertussis. A slow weight gain during early infancy is often observed in children with even minor damage to the brain at birth.

The developmental history gives valuable information as to the mental and motor status of the child. Childhood habits and the parental attitudes toward them should be noted.

A careful examination is required. A child may be cross and irritable and sleepless because of an aching tooth, an infected sinus or intestinal worms. Special attention should be paid to neurologic disturbances, particularly incoordination, athetosis and so on. A defect in vision or hearing may lead to school difficulty and, with it, secondary emotional disturbances.

DEVELOPMENTAL ABNORMALITIES

Under this heading are included many of the common problems of childhood. Disorders of the language functions—speech disturbances, reading disability and spelling disability—are generally regarded as due to a structural abnormality in the brain.

Specific reading disability[2] is said to be present in 10 to 15 per cent of school children and should be suspected in every seemingly normal child who has difficulty at school. It is about four times as frequent in boys as in girls. The characteristics of the syndrome are: (1) difficulty in comprehending the written word. Associated with this are (2) alterations in lateral dominance, (3) disturbances in speech and (4) unusual clumsiness. A further characteristic of the clinical picture is (5) the frequency with which language difficulties and alterations in lateral dominance are observed in other members of the family. (6) Emotional disturbances, arising out of the subjects' inability to read, are generally present.

Alterations in lateral dominance, particularly ambidexterity and mixed dominance, for example right-handedness and left-eyedness, are common in children with reading disability.

Speech disturbances are frequently associated with specific reading disability. There may be delay in the age of starting to talk, impure speech or lisp, stuttering or cluttering speech.

A considerable proportion of affected children are abnormally clumsy. Their movements are jerky, uncoordinated and bungling, and resemble those of the rapidly growing adolescent who has not yet become accustomed to the changes in his body size and proportions. The condition is evident in early childhood but becomes more prominent during the school years when the child starts to write and participate in games. Presumably the basis for this is mixed dominance. In such instances the child, instead of being able to use both hands with equal skill (ambidexterity), uses both hands equally awkwardly (ambilevousity).

That specific reading disability probably has a hereditary basis is indicated by the high incidence of alterations in lateral dominance, speech disturbances and reading difficulties in other members of the family.

Children with this defect are usually anxious and unhappy because they are unable to do their school work as well as their peers. Conscious of their disability and ridiculed by the other children for their mistakes, they approach reading with the expectation of failure. They consider themselves stupid and inferior, and they may refuse to try to read or even to pay attention in school. They are often restless, hyperactive and easily distractable. Parental dissatisfaction with school performance and pressure for better work intensify their anxiety, and these emotional factors further interfere with learning.

Enuresis—There is reason to believe that enuresis[3] is also due to a developmental abnormality. The condition is hereditary, being found with great

frequency in the childhood histories of one or both parents and in the siblings. Urgency, usually associated with frequency, is the chief symptom and may be present without enuresis. Day wetting occurs in about 40 per cent of enuretics. As in the case of children with reading disability, there is a tendency toward spontaneous improvement as the children approach adolescence, but most childhood enuretics continue throughout life to have a lowered threshold toward stimuli which lead to urgency. Emotional factors, arising from the reactions of the child himself, the parents and society to the symptom contribute to the clinical picture.

The fault seems to lie in the response of the bladder to distention. Though the capacity of the bladder is not strikingly altered, the normal reaction of the bladder to distention—a feeling of discomfort—is replaced by an irresistible desire to void.

Motion sickness (car sickness, sea sickness, air sickness, and so on) is probably also due to a developmental abnormality. Like the language disorders and enuresis, it is familial, common, there is a tendency to improvement with time and emotional factors may and usually do contribute to the difficulty.

CEREBRAL DAMAGE

It is generally recognized that gross disease of the brain is often accompanied by changes in the personality. Not so well known is the fact that cerebral damage,[4-5] of so mild a degree as not to give gross changes in motility or in the reflexes may, nevertheless, be the basis for disturbances of behavior in children. The most frequent cause of cerebral damage in children is anoxia at or after birth. Other causes are encephalitis, head injuries, burn encephalopathy, meningitis, neoplasms and, possibly, allergy. In addition other neurologic diseases may present themselves as behavior problems, e.g., myoclonic epilepsy, certain tics, narcolepsy, tuberous sclerosis.

The changes in behavior associated with cerebral damage are similar, regardless of the basic etiology, and are characteristic. There is hyperactivity, which is often marked; clinging behavior; unpredictable shifts in mood without apparent cause; impulsiveness; short attention span; inattentiveness; variable memory; poor performance in arithmetic.

Diagnostic aids are the neurologic and psychometric examinations. Though gross changes in motility are generally absent, careful examination will usually reveal minor changes in posture or in the gait which may be awkward or characteristic of children of an earlier age.

The brain-damaged child may show some dissociation of movements in walking and talking. In walking, the customary swinging movements of the arms may be absent or irregular. Similarly, in the act of talking the normal smooth coordination between the act and respiration may be disturbed. The absence of appropriate facial expressions and associated gestures during speaking may also give an indication of organic brain disease.

Evidence of organic brain disease may be elicited by observing the child in the standing position with the arms outstretched in front of him and the eyes closed. Attention should be paid to choreoathetotic movements of the hands and convergence or divergence of the hands, which indicate extrapyramidal involvement; spreading of the fingers, which is a sign of cerebellar disease; or a consistent lowering of one arm, which is indicative of muscle weakness (the dominant arm is generally held a little higher than the other). Having the child count while standing with the arms extended minimizes the voluntary compensation for minor defects.

Imperfect ocular convergence should be sought for. This is elicited by having the child try to converge on the finger placed on the end of the nose.

Occasionally abnormal muscle twitchings or tremors are observed.

Psychometric tests—Certain of these can be carried out by the physician in his office. Children with cerebral damage are retarded in their ability to copy a diamond (7-year-old test) and very young children cannot copy a square. Memory for digits is poor, especially backward. The children find difficulty with the Goodenough Draw-A-Man Test which has been standardized for age.

The electroencephalogram is generally of no value since the lesion in these patients is usually extrapyramidal.

The outlook for children with cerebral damage is, in general, good. Given a proper home environment, they tend to outgrow their difficulties and, as adults, they usually function normally.

EMOTIONAL DEPRIVATION

Babies who, for one reason or another, remain in hospitals or other institutions for any length of time, do badly.[6-7] They gain weight slowly or not at all; they acquire febrile affections, usually of the upper respiratory tract; they become weak, apathetic and pale, and many die.

It is now generally agreed that the failure of babies to thrive under these circumstances is due to emotional deprivation. The baby is entirely dependent on the environment for emotion-producing situations just as he is dependent for his food. Unlike older children and adults who can originate emotionally charged situations within themselves by day-dreaming or reading and so on, the baby relies entirely on stimuli from without. In the absence of these stimuli—as in a hospital or other institution—he lacks the somatic accompaniments

of emotion which are apparently vital to him.

Children who survive residence in an institution during early childhood show characteristic personality changes. Prominent is an absence of emotional responsiveness. The children are less mature, less controlled, more passive and apathetic, less ambitious and less capable of adjustment related to conscious intention or goal. They remain removed and unattached to other people. Emptiness characterizes all aspects of the institutional child's personality.

ORGANIC DISEASE

A behavior problem may center about a physical defect, such as lameness; or about a disease like asthma, eczema, rheumatic fever and so on. The psychic trauma of an operation may set off an emotional upset. In many cases of childhood asthma the symptoms are greatly exaggerated by the associated emotional factors. The occurrence of school difficulties in children with auditory and visual impairment has already been mentioned.

INTELLECTUAL FUNCTIONING

Both the child with high and the child with low intelligence are subject to special problems. The child with high intelligence may be bored with the clumsy efforts of his schoolmates in the classroom. He does not listen and may not be able to answer satisfactorily when called upon by the teacher. Consequently the complaint may be poor school work. In addition the bright child may take it upon himself to correct the teacher, thereby, naturally, antagonizing her.

The dull child does poorly in school. He may be emotionally disturbed by an appreciation of his own shortcomings, the nagging of his parents and the ridicule of his schoolmates. A common reaction is clowning in the classroom and general overactivity.

CHILDHOOD SCHIZOPHRENIA

This syndrome[8-10] is coming to be recognized with increasing frequency. It is regarded by most observers as innately determined. According to Bender there are three critical age periods for its onset, the first 2 years of life, between 3 and 4½ years, and between 10 and 11½ years.

The afflicted child exhibits abnormalities in behavior in every area of integration and patterning within the nervous system. Bradley has listed the symptoms as (1) *seclusiveness* and (2) *irritability* when seclusiveness is disturbed. These two characteristics generally appear early and are present in most patients.

Other manifestations are (3) *daydreaming*, or preoccupation with thoughts and fantasies definitely in excess of what is usually seen in children of similar age and developmental status; (4) *bizarre behavior* which consists of incongruous actions and activities such as repetitive, purposeless motions, unintelligible language, and irrelevant expression of emotion; (5) *diminution of interests* or failure to be attracted by objects and activities which one usually anticipates in children of similar age and intelligence; (6) *regressive personal interests* or the voluntary selection of and participation in amusements and occupations which customarily intrigue children of younger age levels; (7) *sensitivity to comment and criticism*, i.e, excessive emotional response to such personally directed opinions of others as praise, blame and so on; and (8) *physical inactivity*, i.e., conspicuously less gross motility than is commonly seen in other children of the same age and developmental status. (Often the reverse is true and motility is excessive.)

A prominent feature of the clinical picture is *anxiety*. It represents the child's reaction to the disrupting effects of the disease. How he manifests his anxiety depends on his developmental status and his innate capacities. In some patients anxiety is the dominant feature of the condition.

Psychologic testing is of considerable diagnostic aid. In the majority of cases results of I. Q. testing are not representative of the subject's true mental level. Some children, however, show considerable unevenness in functioning, such as an unexpected and unpredictable break in the sequence of successes which appears to be unrelated to the difficulty of the task. The average child shows a fairly even progression of successes with failures increasing as the tasks become more difficult. In the child with schizophrenia the failures and successes may take place in jumbled fashion and consequently the final score is without true predictive value. The responses may not only be incorrect, they often appear illogical. Even correct responses may be arrived at by unusual lines of reasoning.

The results with the Goodenough Draw-A-Man Test are in no way a measure of the intelligence of the child with schizophrenia. The test is, however, of considerable value in revealing some of the child's inner preoccupations. Sometimes the figures which the children draw are distorted, flat and meaningless, and empty of detail. On the other hand the figures may show great detail in the head, feet and hands. The test reveals, by what is emphasized and what is subordinated, the way the child conceives of himself and his relationship to the outside world.

Other drawings often show confusion and mental disorganization such as disturbed spatial relationships, for example the arms coming off the head, the hands protruding from the body without arms; elongations of various parts of the body, protrusions, deliberate omissions; overemphasis on the extremities, the hands, fingers, feet, toes, facial fea-

tures, and hair being drawn with careful but bizarre detail while the remainder of the figure is more or less neglected; and transparencies showing introjected bodies, that is, the incorporation into the body of objects from the outside world.

The Rorschach Test may be helpful in revealing the particular way of life the child has chosen for getting along in the world. Des Lauriers and Halpern divided the responses of children with schizophrenia into two groups:

1. The records resemble those obtained from children with organic brain disorder. They are short, show poor form and even bizarre responses, have a tendency to perseveration (that is, giving the same responses to many of the plates), lack adaptability, and have general intellectual and emotional impoverishment. The responses differ from those of the child with organic brain disease in that the child with schizophrenia seems indifferent to the whole procedure while the organic child struggles with his task.

2. The responses resemble in many ways those of the neurotic child in showing doubt and uncertainties. However, the records of the child with schizophrenia show sudden and unexpected changes in odd ways and unusual places. In addition, there may be sudden refusal of one of the Rorschach plates, often one which is generally considered easy.

On the Thematic Appreciation Test the child with schizophrenia often builds up dramatic stories which may have no relation whatever to the picture which is presented. The tales may be fantastic and concern such abstract problems as life, death, God and the devil. In addition, he tends to interpret the pictures as referring to himself.

PARENTAL ATTITUDES

Parental mismanagement accounts for the large number of everyday minor problems in children and for some of the major ones.

A convenient terminology has been developed to characterize parental attitudes. Parents may be described as overaffectionate, underaffectionate, rejecting or indifferent. They may be overprotective, overindulgent, overanxious, perfectionist or overauthoritative.

For the most part, parental attitudes can be readily assessed but certain ones, notably overanxiety and rejection, may be and often are concealed. The overanxious parents often present a veneer of indifference; the rejecting parent may be effusive in her attentions to the child.

Parental attitudes are by no means fixed and immutable. A common example of spontaneous change is seen when a first born, previously pampered child, misbehaves after the birth of a sibling. Under these circumstances the first born may come to be rejected, the parents blaming him for misbehavior which stems from their mismanagement.

The parental attitudes may have their origin in ignorance of proper methods of child rearing, or they may arise from deepseated personality distortions. As one might expect, if the latter is the case the disturbance in the child is likely to be more severe and therapy less successful. Neurotic adults frequently marry not out of real affection but rather to get out of an environment—that is, their home—which they find distasteful or even hateful. Marriage on this basis is not likely to be a happy affair. It is accepted only tentatively. The first child is often rejected because he is looked on as a bond sealing an undesirable marriage more closely. Sometimes the reverse happens, more often with the second child, and the neurotic mother pours out all her pent-up affection on the child.

The personality of the parents is not the sole factor determining how they feel and behave toward their children. The child is not a passive recipient. He takes an active part in establishing the parent-child relationship. The child is innately endowed with personality attributes which are distinctive and individual in the same way as is his physical makeup and some of these personality patterns are already apparent early in life. A mother who finds comfort in a sweet, placid baby may be antagonized by one who is active and energetic. The mother who is herself of a bossy, aggressive makeup may get along very well with the child who is pliant and submissive but may clash with another whose personality is fashioned after her own. The mother who considers aggression manly may dislike her 2-year-old if he can not fight his own battles.

The attitude of the parents is influenced to a large extent by the physical and mental health of the child. For a long time after a severe acute illness the parents generally continue to be overanxious and oversolicitous. The feelings of parents toward the child with cerebral palsy and other chronic crippling diseases are often mixtures of affection, rejection, hostility and guilt.

Other considerations relating to the child may also be of importance. Whether he is of the desired sex, whether he is good looking or not, how intelligent he is, whether he cries a great deal; these and many others may and often do influence parental attitudes.

A third group of factors to be considered in determining parental attitudes may be termed incidental factors. A baby may be rejected because he was born at the wrong time, e.g., out of wedlock or when the family finances were low. On the other hand, he may be the object of overaffection because of the death or severe illness of a sibling. A mother may be curt and impatient with her children because she is overfatigued or bored with house work and this is especially the case with mothers who have interests in business, profes-

sional, social or community affairs. The difficulty in obtaining household help makes this of increasing importance in the pathogenesis of minor behavior problems.

Parental experience is another factor as indicated by the greater frequency of problems with the first than with the later children.

It is only by taking into consideration the three factors, the parents and their relation to one another, the child, and incidental factors that one can arrive at an understanding of how parental attitudes affect the personality development of the child. Only in this way can one understand why in the same family, some children present difficult problems and others do not. Though not pertinent to the subject at hand, the different personalities of the children in one family add to the problems confronting the parents.

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Treatment of Pneumonia

JOHN M. ADAMS*

UNIVERSITY OF CALIFORNIA, LOS ANGELES

ADAMS

The advent of specific therapy in the treatment of infectious diseases has dramatically altered the whole complexion of these illnesses and even appears to have changed the incidence of them. The bacterial pneumonias no longer hold the spot light or constitute much of a problem from the point of view of treatment. The accurate diagnosis of these pneumonias, in spite of improved methods, has become increasingly difficult to impossible due to the almost universal use of these specific agents in the treatment of all forms of respiratory illnesses. As a result of these wide practices and also as a result of a greatly increased awareness of the nonbacterial pneumonias, they now constitute the major therapeutic problem in this field.

Most of the primary respiratory tract infections, capable in the proper host of causing pneumonia, have still not been shown to respond directly to the recent antibiotics such as aureomycin, chloramphenicol or terramycin. Primary atypical pneumonia in certain epidemics appears to be favorably influenced by these drugs, but as yet the accurate diagnosis of the viral agent in these diseases is most difficult, and there are many forms of viral pneumonia which do not appear to be responding specifically. Fortunately, these pneumonias in older children and adults rarely are fatal and good medical care usually results in a cure. The infant with nonbacterial pneumonia is still a major therapeutic problem as is the child with recurring episodes of respiratory disease, many of which turn out to be pneumonia.

*Chairman of the Department of Pediatrics, School of Medicine, University of California Medical Center, Los Angeles, California.

GENERAL MEASURES

In general, *rest* is most important. The word implies pleasant surroundings, and calm and unhurried attendants. The frequent medications, particularly when injected intramuscularly, have too often interfered with the patient's rest. The larger dose administered at 12-hour intervals appears to be just as effective if not more so. It provides a higher level of the therapeutic substance and therefore has an added advantage.

The *fluid* management of pneumonia is not a critical matter and may be overdone, particularly

in infancy. The child should be allowed fluids as desired by mouth, but no forcing is indicated. If high fever persists and is associated with vomiting or diarrhea, extra fluid may be required; however, the rapid responses of the fever to therapy and the patient's own willingness to take fluids rarely call for the parenteral use of fluids. A good urinary output should be maintained.

The *diet* in the general management of pneumonia requires no special attention except to offer readily digestible foods as desired by the patient. In the rare case of abdominal distention, certain restrictions may be indicated. In infants, the solid foods may be omitted until the patient is better.

Oxygen therapy is most valuable in the treatment of pneumonia and should be used freely if indicated. Nearly all infants with pneumonia will require oxygen. Dyspnea with an increasing pulse rate is a sufficient indication. Cyanosis is a definite sign of the need for oxygen therapy, but the physician should not wait for it to develop. Restlessness may be prevented by the use of oxygen and the need for sedation may not arise. This form of therapy is best given by a tent which covers the patient's head and shoulders. Occasionally intranasal oxygen is accepted by the patient and improvement is striking. The tent will increase the apprehension of some children, and due consideration should be given to the psychology of its use by discussing it with the patient first. The tents which allow full vision are better from this point of view. The oxygen should be cooled, and a thermometer kept in the tent to check the temperature frequently is useful. Temperatures from 70 to 75° F. are desirable. The oxygen content should be ascertained and concentrations from 40 to 80 per cent should be maintained. The combined use of carbon dioxide given intermittently will stimulate deeper breathing and serve as an expectorant to counteract the drying effects of pure oxygen. Humidity, given in the form of nebulized cold water, will be of great benefit in some infants with laryngotracheobronchitis and pneumonia. This may be introduced into the oxygen tent with safety by means of the newer equipment now available.

ANTIBIOTICS

There seems to be little doubt that penicillin is here to stay, but some of the newer antibiotics make possible the treatment of diseases known to be unaffected by penicillin. For example, the specific value of aureomycin, chloramphenicol and terramycin in certain virus diseases, the rickettsiae; and the efficacy of dihydrostreptomycin in tuberculosis. It therefore becomes increasingly necessary to gain a clear concept of the specific indications for each. As the list grows, differentiation will become even more important for utmost therapeutic efficiency.

Since the pneumonias may be due to a variety of living organisms, including bacteria, fungi, protozoa, rickettsia and viruses, the best result from specific therapy will depend on the choice and use of the proper therapeutic agent.

The pneumococcal pneumonias respond best to penicillin and larger doses than formerly recommended are now being used at longer intervals One hundred to two hundred thousand units at 12-hour intervals have been found effective. This antibiotic is the drug of choice at the present time for beta streptococcal infections. The dose and interval should be judged on the clinical and laboratory evaluation of the patient.

The staphylococcal pneumonias appear to respond better to aureomycin as many of these organisms seem to be highly resistant to penicillin. Dihydrostreptomycin was useful against the Pfeiffer bacillus and the Friedlander bacillus, but further clinical experience may indicate that one of the newer antibiotics will be the drug of choice in these instances.

Aureomycin was used in a group of 39 children recently reported by Olshaker, Ross, Recinos and Twible. Thirty of the children ranging from 3 months to 11 years were considered to have bacterial pneumonia; a pneumococcus was isolated in 16 instances. Aureomycin was given in doses of 40 to 100 mg. per kilogram of body weight by mouth. Intramuscular injections were given every eight hours in daily amounts not exceeding 3 to 12 mg. per kilogram, but were considered inadvisable if the drug could be taken by mouth. The elevated temperatures were reduced to normal in less than 36 hours and sometimes in 12 hours.

Many reports now seem to indicate that aureomycin, chloramphenicol and terramycin may be employed with benefit in atypical or viral pneumonia. The response is less dramatic than that usually looked for in bacterial infections. These drugs are being used with benefit in the rickettsial diseases and definitely indicated where this diagnosis can be made or is suspected. Specific therapeutic measures for the treatment of the pneumonias due to the fungi and protozoa have not been found.

With the ever increasing parade of effective and safe antibiotics, a greater premium than ever is being placed on accurate diagnosis, and our most pressing need in the pneumonias today seems to be in the direction of better and more reliable methods of diagnosis.

EDITORIALS

Postgraduate Medicine FOR THE CONTINUING EDUCATION OF THE PRACTICING PHYSICIAN

Editor-in-chief: CHARLES W. MAYO, M.D.
Contributing Editor and Editorial Writer: MORRIS FISHBEIN, M.D.
Assistant Editor: SYLVIA COVET

MARCH 1951

HIPPOCRATES IN MODERN MEDICINE

HIPPOCRATES teaches us three things that impress us in our daily practice: sublime ethics, sound judgment and sharp observation. In the most remote times of human history, medicine had already attained a position of respect and honor. "Medicine is of all arts the most noble," he affirms in the fourth century B.C. on the island of Cos. We are servants of man and serve by serving. We are humble soldiers in a mighty international army, our duty to support health, to heal disease, to stay pain, to lengthen life, "To do good and not to do harm."

We take and abide by the deathless Hippocratic oath:

> "I will follow that system of regimen which, according to my ability and judgment I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous. I will give no deadly medicine to anyone if asked, nor suggest any such counsel; and in like manner I will not give to a woman a pessary to produce abortion. With purity and with holiness I will pass my life and practice my art. I will not cut persons laboring under the stone, but will leave this to be done by men who are practitioners of this work. Into whatever houses I enter, I will go into them for the benefit of the sick, and will abstain from every voluntary act of mischief and corruption."

A cultured profession, not a haggling trade, never a narrow handicraft, our calling is built upon an historic edifice of service, understanding and charity, embellished by such lives as Imhotep, Sydenham and Osler. None of us can read Hippocrates without throbbing with the sacred nature of our charge.

"Life is short and the art long, the occasion fleeting, experience fallacious and judgment difficult." This immortal aphorism bares the very flesh of medicine. Knowledge of facts alone does not make judgment but the selection of the important from the unimportant does. That therapy which is least dangerous and which is most likely to grant the happiest and longest life should be our choice. We must intercede at the precise moment as a marksman times a living target. We must ever keep the general state of the patient in sight while observing and treating local pathology. We must know the effect of the environment upon the organism, the organism upon another organism, the organism upon the viscus, and the effect of the viscus upon every other viscus. Since all that pertains to man pertains to health and disease, the study of medicine is the study of man, and this study begins with the medical diploma and continues unabated throughout the entire life of the practitioner, "a love of labor and perseverance."

In attaining sound judgment, medical machinery must not foreshadow fundamen-

tal principles of medicine, nor laboratory diagnosis displace physical and psychiatric diagnosis. Too often we overstress the importance of the instrument, minimizing the specific pathology and the proper therapy. The patient not the tool; what our senses tell us, not only what our equipment detects; these are cardinal. "It is a disgraceful and awkward thing," notes the great Coan, "to use mechanical means in an unmechanical way."[5] Only today are we beginning to learn the limitations of laboratory procedures and converging our attention upon the ill one and especially upon etiology.

Hippocrates' insistence on exacting individualized observation, his concern over the growth of medicine on its loftiest plane, his broad knowledge tempered by error and respect for the past, his cautious conclusions, his recommendations of continuous study, his hatred of sophistry and superstition—these rigid principles make his time-disdaining works the best read in scientific medicine. Writes Professor Neuberger, "Admired by all, really understood by few, imitated by many, equalled by none, he was the master of medicine for all time."

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Frederick Stenn, M.D.
University of Illinois, College of Medicine, Chicago

MUSCULAR DYSTROPHY

Toward the end of the nineteenth century physicians became aware of a condition now known as progressive muscular dystrophy which has been variously called "dystrophia musculorum progressiva" or "primary myopathy" or, according to type, "pseudohypertrophic" or "simple atrophic" or "Duchenne" or "Leyden and Möbius," or others. As might be expected the various forms of the disease are not too easily distinguishable from each other. Dr. F. H. Tyler proposes classification into just two types: (1) a childhood type which includes at first some enlargement of muscles, but is rapidly progressive and fatal; (2) a type which appears in late childhood or adolescence called facioscapulohumeral, rarely accompanied by muscular enlargement and involving the facial and pectoral girdle muscles early.

(AP Photo)

Four Godfrey brothers of New York, all victims of progressive muscular dystrophy.

Muscular weakness is the chief characteristic of this disease. Children who develop it before they are six cannot stand at 10 or 12 and frequently die in adolescence.

A philanthropic Muscular Dystrophy Association has been formed with more than a score of branches in various cities. Local chapters are composed of parents of children with this condition and afflicted adults. Estimates indicate approximately a hundred thousand cases at all times in the United States. More than half of those afflicted are children between 3 and 13 years old.

At present the center of research on this distressing condition is the New York Hospital-Cornell Medical Center in New York, where workers under the leadership of Dr. Ade T. Milhorat are trying to determine some single causal factor and with it a lead toward a specific treatment.

Present leads incline toward the concept that progressive muscular dystrophy is a

deficiency disease associated with faulty metabolism. From time to time the treatment has included vitamin E or tocopherol, inositol, pyridoxine, testosterone and glycine. Actually scientific evidence is not yet available to prove that any dietary supplement really helps. Obviously everything possible should be done to maintain activity and interest of the patient.

MORRIS FISHBEIN

EFFECTS OF ACTH AND CORTISONE ON RHEUMATIC FEVER

UNDER the leadership of the American Council on Rheumatic Fever of the American Heart Association comes a long-term study of the effectiveness of ACTH and cortisone in the treatment of rheumatic fever and the prevention of rheumatic heart disease. The project includes a coordinating center in New York and 12 cooperating research centers in the United States, Canada and Great Britain. Patients treated with the products mentioned during the acute attack of rheumatic fever will be followed for three years. All the results will be reported to the New York center. Results in the United States will be compared with those reported to the Medical Research Council in Great Britain.

Already results reported indicate a type of control over rheumatic fever never previously seen. Yet knowledge must be gained as to whether or not the course of the disease is truly altered or just the symptoms repressed. If patients relapse after the disease has become stationary, why? A recent report by Dr. May Wilson indicated cessation of the symptoms and, after several months, failure to find any signs or symptoms referable to the heart.

Armour and Co., which produces ACTH and Merck and Co., Inc., which produces cortisone, contributed five thousand dollars each toward planning the study. The National Heart Institute has financed the coordinating center and the research centers in New York, Boston, Denver and Chicago with a grant of $200,000. The Armed Forces Epidemiological Board and the United States Air Force are financing a cooperative venture at the Francis E. Warren Air Force Base in Wyoming. The Canadian Rheumatism and Arthritis Foundation has subsidized a research center in Toronto and in England the Medical Research Council arranged to finance its center and its research facilities. Appended is a list of the cooperating research centers and the principal research investigators.

Rheumatic fever has been called the most deadly killer of children between 5 and 15 years old. And now a new hope lights the horizon!

MORRIS FISHBEIN

The cooperating research centers and principal research investigators at each center are:

City	*Institution*	*Principal Investigators*
New York	New York University-Bellevue Medical Center (including Irvington House)	Dr. Currier McEwen
New York	College of Physicians & Surgeons, Columbia University	Dr. Edward E. Fischel
Boston	House of the Good Samaritan	Dr. Benedict F. Massell
Fort Warren, Wyo. and Cleveland, Ohio	Francis E. Warren Air Force Base and Western Reserve University	Dr. Charles H. Rammelkamp
Denver	University of Colorado	Dr. Harry H. Gordon
Chicago	University of Chicago (including Jackson Park La Rabida Sanitarium)	Dr. Albert Dorfman
Toronto, Ontario, Canada	Hospital for Sick Children	Dr. John D. Keith
Newcastle London Taplow Cardiff Sheffield	Medical Research Council, England	Sir James Spence (Chairman, ACTH-Cortisone Study Committee) Dr. Eric G. L. Bywaters (Secretary, ACTH-Cortisone Study Committee)

CESAREAN SECTION

THE combined obstetric services of Woman's Hospital and Sloane Hospital and Bellevue for the years 1934-48 inclusive performed a total of 4 per cent of cesarean sections in the obstetric cases coming to those hospitals. Since that time the rate has increased to 6.2 per cent. Dr. D. A. D'Esopo of the department of obstetrics and gynecology of Columbia University College of Physicians and Surgeons ascribes the increase to the introduction of the antibiotic drugs for the prevention and treatment of infections and to the inauguration of hospital blood banks.

For the past 10 years a slow but steady substitution of abdominal delivery for vaginal obstetric operations has occurred. In 1939 cesarean sections constituted 35 per cent of the total operative deliveries at the Sloane Hospital whereas in 1948 the figure rose to 70 per cent. Cesarean section is used in the management of placenta previa in 75 per cent of cases. What this has meant in the saving of the lives of mothers is indicated by the fact that the maternal death rate in placenta previa for the first half of the survey was 6.4 per cent but not a single death from placenta previa has occurred in this service for the past nine years. Among other important observations is the statement that cesarean section is no longer done for cardiac disease; Doctor D'Esopo is convinced that cardiac disease per se should never be a primary indication for cesarean section.

In a special review of the trends in cesarean section in Cornell University's Medical College and in the New York Hospital, Drs. R. G. Douglas and R. Landesman report a rise in the incidence of cesarean section from 2 per cent to 4 per cent with a replacement of the low flap section by the classical cesarean operation. In that service sulfonamide and penicillin therapy combined are instituted for five conditions: (1) ruptured membranes and 12 hours of labor or intact membranes and 24 hours of labor, with delivery not imminent; (2) abnormal presentation or questionable dystocia with trial of labor; (3) intrapartum or intercurrent infection; (4) desultory labor, anticipated prolonged labor, anticipated cesarean or difficult delivery; (5) intrapartum or postpartum uterine hemorrhage. During the past eight years, these obstetricians report, there has not been a death of a mother from infection.

From the department of obstetrics and gynecology in the Milwaukee Hospitals comes a report by Drs. L. H. Verch, J. G. Stouffer and R. S. Cron covering 1,231 consecutive cesarean sections from 1933 through 1947. Here again penicillin and sulfonamides were used in all potentially infected cases. The dictum "Once a cesarean, always a cesarean" was followed. The results from the Milwaukee Hospital parallel those of the institutions in New York mentioned previously. The total incidence of cesarean section for the 15-year period was 6 per cent, with a maternal mortality of 0.81 per cent. During the last five-year period not one mother was lost. The stillbirth rate was only 1.6 per cent and the neonatal death rate was 2.5 per cent.

The figures here considered are an indication of the magnificent results that have been accomplished through the use of antibiotic drugs, blood transfusions, new knowledge regarding nutrition, preoperative and postoperative care and above all newly developed knowledge of both the physiology and pathology of obstetrics.

MORRIS FISHBEIN

Men of Medicine

The Mosquitoes said "Uncle"

This article was written by Dr. Frederick R. Taylor, friend and physician to Dr. White. Dr. Taylor is part-time Professor of Medical Literature and Associate Professor of Clinical Medicine at Bowman-Gray School of Medicine, Winston-Salem, North Carolina.

IN 1859 California had been a state for less than 10 years; Walter Reed was only eight years old; and Washington, D. C, was seeing the end of an era, of a sort, as it housed the last White House resident to wear the old-fashioned stock as a neck-piece. Yet in the next 40 years all three of these were to have occasion to know well and to remember a man who was born that year in a little town named Milledgeville, in Georgia—Joseph Hill White, physician, sanitarian, and pioneer in what has been called "medicine's greatest detective story"—the pursuit and capture of yellow fever.

California was to know Doctor Joseph Hill White as the man in charge of ridding San Francisco of bubonic plague; Washington as friend and colleague of President Theodore Roosevelt and Carter Glass, and also as chief general inspector of the United States Public Health Service. And Walter Reed was to know him as the man responsible for wiping out an epidemic of yellow fever by mosquito control in 1899, preceding the final report of the Reed Board in Cuba by almost two years.

Sixty-eight years have passed since young Joseph White was graduated from the University of Maryland in 1883 . . . "near the top of my class," he says now, but if pressed for further details he will add that it was the first and last time he ever placed less than first in any examination. This incidental intelligence is consistent with the distinguished achievements of his forebears: both he and the girl who later became his wife could trace their families to an astonishing number of famous people, among them the Emersons, Lowells, Searses, Gardiners and Dr. Henry A. Christian of Boston; the Christians and Carter Glass of Virginia; and to five Presidents of the United States—the two Adams', both Roosevelts, and Andrew Jackson. It is a truism that resourcefulness and enterprise are the marks of the true pioneer, and even as it was to be demonstrated in the career of Doctor White, so also was it evident in that of his family who, in the person of a young Irish baronet, played a major part in the establishment in 1636 of Newtowne School, now Harvard University.

For the first five years of his life young Joseph lived the normal life of any child of that day who had been born into a home of means, but Milledgeville was directly in the path of Sherman's march to the sea, and 1865 found the family's material wealth either plundered or destroyed. As he says now, even his relative, Lieutenant-General Hill of the Confederate Army, couldn't save them. Along with thousands of southern families, the Whites were reduced to starkest poverty; Joseph's early education was the improvised product of determination, character and courage in the first decade that followed the end of the war.

He was 14 when the decimated state of the family resources decreed that he quit school and help to earn his living; he became a telegraph messenger, and his promotion to operator followed a year later. But this was not enough to satisfy the descendant of that certain early settler of the Massachusetts Bay Colony, who also had had to rebuild a damaged fortune. Young Joseph's uncle, Samuel G. White, was a physician in Maryland; plainly there was more challenging work to be done. But education cost money—then as now—and Joseph resigned his position as senior telegraph operator (he was still in his teens) and became a bookkeeper. He averaged at least 16 hours a day, becoming an expert accountant—and by the time he left for Baltimore's College of Physicians and Surgeons he had earned $500 to finance him through school. He had already been virtually self-supporting for six years, had mastered two different jobs, and—most important—had determined to join his uncle in the practice of medicine.

Dr. Samuel G. White of Baltimore was an excellent man to emulate. Dr. L. McLane Tiffany, Dean of the School of Medicine of the University

of Maryland, had called him "the most learned physician and courtly gentleman" that he had ever known. Dr. Samuel White proceeded to teach his young nephew so well that the latter was able to piece out his meager earnings by tutoring students—many of them older than he—who had fallen behind in their work, and managed at the same time to maintain his own high scholastic average until his graduation in 1883.

With his subsequent admission (by examination) to the United States Marine Hospital Service, forerunner of the United States Public Health Service, Dr. White began a career in public health administration which was to last more than 50 years. It took an assignment to New Orleans, in 1884, to crystallize his interest in the etiology of yellow fever—first, because that city was literally a swampbed of infection, and second, because he himself came down with it, "and then and there declared war on that disease." It was to be 20 years until the New Orleans brand of yellow fever would again see Joseph Hill White, and then under memorable circumstances. Meanwhile there was time for him to marry Miss Emily Humber in 1885, and to begin raising a family of three daughters and one son with the wife whom he still regards as "the most perfect woman I have ever known."

Transferred from New Orleans to Savannah, Dr. White commanded the South Atlantic Quarantine at Blackbeard Island. Realizing that this was a serious potential point of entrance of yellow fever to the United States, he got the station raised to first-class rank, meantime discharging his regular duties in charge of a smallpox epidemic in southern Georgia. But Hamburg, Germany, was suffering from an outbreak of Asiatic cholera, and in 1893, after a brief tour of duty in New York for the study of immigration problems, he was sent to Hamburg as U. S. Sanitary Representative, charged with preventing the spread of cholera from there to the United States.

Here he worked with the famous Dr. William Phillips Dunbar, for whose studies in bacteriology he had great respect. Together they devised tests for carriers and for suspected material that enabled them to release many emigrants and millions of dollars worth of goods for transportation to this country. It was while engaged in this work that Dr. White contracted the second of the three great scourges with which he was to deal during his career: he learned about cholera not only as physician but as victim. That illness was not his only memento of Hamburg, however; when his work was completed, he was presented with a handsome epergne in token of his distinguished service to that city.

Back in the States, Dr. White became Quarantine Inspector of the southeastern seaboard from Norfolk to Jacksonville, and once more was in charge of epidemics of smallpox and yellow fever in Florida, Louisiana and Mississippi. It was not long before he was ordered to the Marine Hospital on Staten Island, largest hospital in the Service. During this time, and the time which followed as head of the Medical Staff on Ellis Island, he worked with the Police Commissioner of New York City, and incidentally a relative of his—Theodore Roosevelt. They were to meet again in Washington during TR's administration as President, but Dr. White got there first, when, in 1899, he was made Assistant Surgeon-General in charge of the Marine Hospital Service Quarantine Division, with headquarters in the capital city.

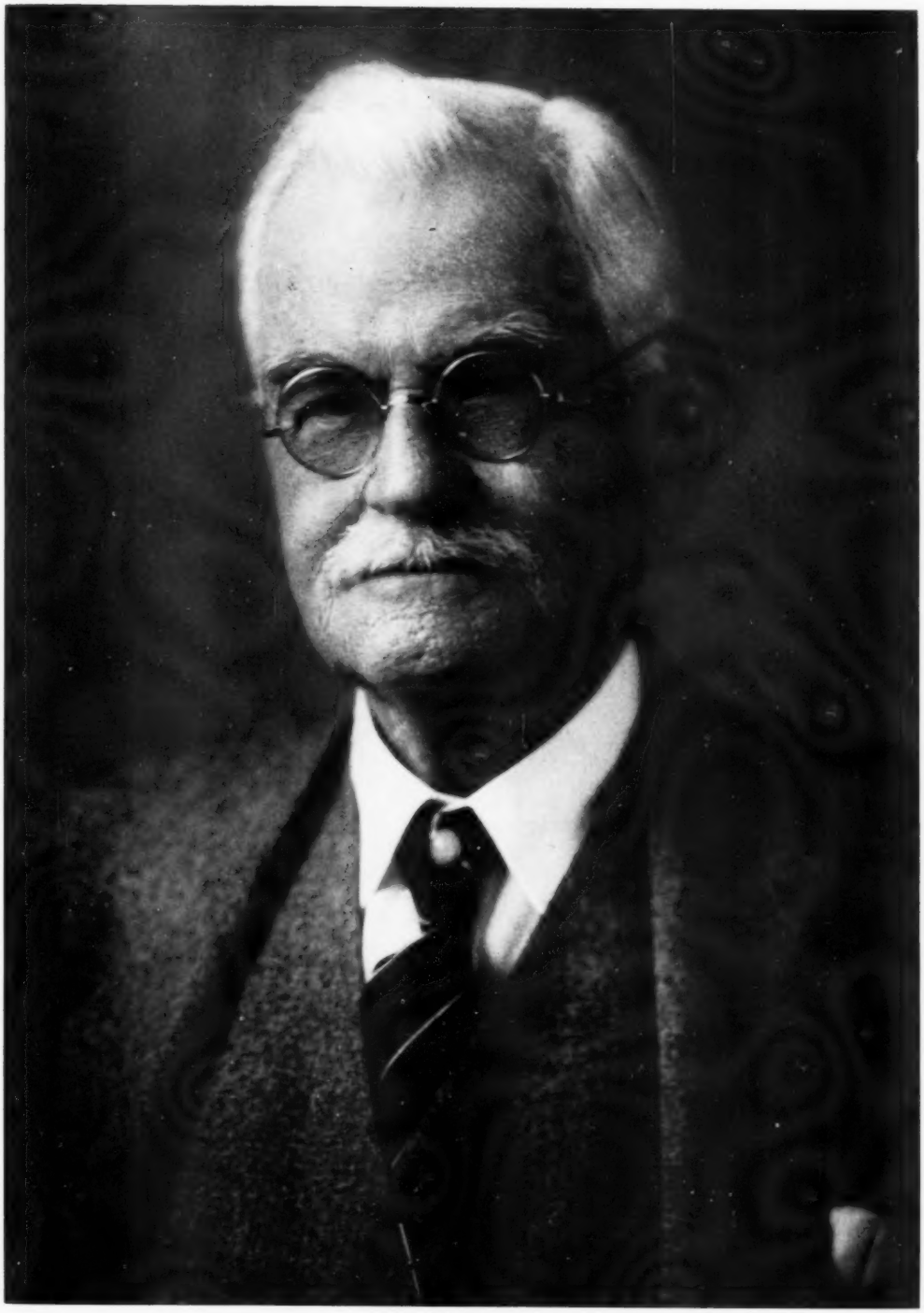
Hardly had the Whites begun to get established in Washington when the nation was startled by an outbreak of yellow fever in the Old Soldiers' Home at Hampton, Virginia. And it was at this point that the true genius of Joseph Hill White began to shine.

For years he had been an intensive student of yellow fever. He had made himself thoroughly familiar with the "mosquito-borne" theory of Dr. Carlos Finlay of Havana, and with the "insect-borne" theory of Dr. Henry R. Carter. Over the years as public health administrator he had himself observed an incidence and distribution of the disease that best fitted the mosquito-borne theory, and he had not forgotten his personal experience in New Orleans 16 years before. Thus it was the night before leaving for Hampton to deal with the epidemic on its own grounds, when he was visited by an old colleague and friend who also was deeply concerned with the problem of yellow fever. Dr. White told his fellow doctor that he intended to try to wipe out the Hampton epidemic by mosquito control. He did try, and he succeeded; his visitor, the night before Dr. White had left on that mission, had been Dr. Walter Reed.

Today he still carries the gold watch whose inscription is a testimonial to this earliest triumph over yellow fever. Had Dr. Reed lived to present his own final report of the epoch-making work of his Yellow Fever Board, he had planned to credit Dr. Joseph Hill White with his truly pioneer work at Hampton, which preceded the final report of the Reed Board in Cuba by almost two years.

Shortly after his success at Hampton, Dr. White discovered that apparently the yellow fever of New Orleans and the cholera of Hamburg had set an unpleasant precedent: in 1900, while ridding San Francisco of bubonic plague, he also learned about that disease as both doctor and patient. He was indeed well qualified to serve as Professor of Hygiene and Sanitary Science when sent to the University of Alabama three years later!

Just six years to the day from its appearance at Hampton, yellow fever once more broke out in the



JOSEPH HILL WHITE (at 80)

Uncle Sam: You're Doing Fine, Doc; Keep It Up!
NEW ORLEANS
SCIENTIFIC METHODS
SAY, UNK, I'M GOING IN THERE AN' SOAK THAT SKEETER A FEW MYSELF
WHITE
STEGOMYIA
MERCY!

Cartoon in the New Orleans *Times-Democrat* (1905), when Dr. White led the campaign which succeeded in ridding the city of yellow fever by mosquito control alone (for the first time) during the last epidemic of the disease in the United States.

United States. The place, New Orleans; the year, 1905; the doctor in charge, by order of President Theodore Roosevelt, Joseph Hill White. By this time, of course, the Reed Board had proved beyond peradventure that yellow fever was carried by the mosquito now known as *Aedes aegypti,* though many conservatives were not ready to accept the idea. Dr. White's administrative skill, backed by courage and tact, overcame all antagonism, and by mosquito control alone he accomplished something which had never been done before on such a scale. Not only was the epidemic wiped out, but for the first time in history, and solely by mosquito control, it was wiped out before frost. It was the last epidemic of yellow fever in the United States. The City of New Orleans gave him a very handsome testimonial silver service, and the New Orleans *Times-Democrat* even published a cartoon in his honor!

From New Orleans, Dr. White supervised shipping precautions from yellow fever-ridden countries to the United States. Within about nine years he admitted 35,000 persons to New Orleans from those countries, without a single new case developing in that city. His method was simple, but it worked. He merely required that such persons give their word of honor to report daily for seven days for inspection. *Only two persons violated that pledged word,* and these were promptly fired by their employers. Dr. White's comment was, "God send us more such employers!" When not engaged directly with administrative duties he taught physiology at Newcomb, the Women's College of Tulane University.

In 1917, after a tour of duty in Memphis where he was also a member of the summer faculties at Peabody Institute and the University of Tennessee, he was commissioned General Inspector of Anti-Malarial Work in the Army of the United States. He was offered a major-generalship, but this would have required his resignation from Public Health Service, and he preferred to serve as a Colonel instead. After World War I he was made General Inspector of the U.S.P.H.S., which had assumed responsibility for hospitalization of the returning army. Secretary of the Treasury Carter Glass valued

Dr. White's army work so highly that President Wilson commissioned him Assistant Surgeon General of the U S.P.H.S.

In 1921, Dr. Wycliffe Rose, head of the Rockefeller International Health Board, appointed Dr. White Director of the World-wide Campaign Against Yellow Fever. He worked in Central America, Colombia and Brazil, and satisfied himself that Hansen in Peru and Parejo in Ecuador were adequately eliminating the disease in those countries. It was during this time that Hideyo Noguchi worked with Dr. White in the yellow-fever campaign, and at that time put forth his unfortunate belief in the so-called *Leptospira icteroides* as the cause. Noguchi was so insistent that he be sent to Africa to prove his point that Dr. White was forced to let him go—to his martyrdom, as it proved.

Having eradicated yellow fever from all of Central America and almost completed his work in Brazil, he suffered serious hemorrhages from peptic ulcers which had developed during World War I, and had to come home while others completed what he had begun.

It is highly significant that all of the countries which he cleared of yellow fever, from 1905 when stationed in New Orleans, until 1925 when he was with the International Health Board, have remained clear of the disease ever since. Truly his career has come a long and honorable way from the day in 1909 when he spoke before the American Medical Association in St. Louis, urging a world-wide campaign for the eradication of yellow fever; and from the day when he had first announced that the carriers must include a *jungle* mosquito as well as *Aedes aegypti,* a house mosquito—which he had deduced from reports of natives from the Amazon jungles and which since has been proved beyond any doubt.

Such a career is remarkable enough in itself, but what of the human side of Dr. White? Only one who has known him can really appreciate him. Though now nearly 92 years old, he remains a most vigorous and forceful man whose alertness of mind is amazing, and only with the failure of his sight in recent years has he been forced to give up his lifelong and discriminating interest in books.

I first came to know Dr. White about five years ago, when he came to High Point from Washington to visit his daughter, and I was honored by a request to attend him professionally. It is with his consent that the statement is made here that at that time he had a massive gastric hemorrhage which he endured with indomitable courage and faith, and recovered entirely from it. He had one cataract extraction when nearly 90 years old, but the sight of that eye now is failing again, and the other eye has a cataract.

But many things and people and places crowd his memory and it has been an extraordinary privilege to sit at his feet in spare hours and listen to his reminiscences of more than 90 years. Humorously now he will tell you that he is probably one of the few victims of migraine to have been literally cured by a bolt of lightning and still live to tell the tale, though it is not a treatment which he recommends. Standing in his room during a violent thunderstorm, he was struck near the waist by a lightning bolt which burned a spiral path down one leg and through his foot. The force of the bolt threw him across the room with such force that his skull was fractured. His doctor told him the prognosis was grave; very probably, he said, young Joseph could not live. "Nonsense," said Joseph White, who was to live to save millions of others over the years—and recovered completely.

Inevitably, with such a career, the recollections include many impressions of other famous men: Reed and Gorgas, who were his close friends until they died; Chagas (of Chagas' disease), whose ability Dr. White considers even greater than that of the famous Oswaldo Cruz for whom the *Trypanosoma cruzi* was named; Kitasato, whom he knew personally and regards as the supreme Japanese scientist; President McKinley, who earned Dr. White's highest respect through his handling of a particular crisis which occurred during the return of troops from Cuba in 1899. That was the year in which a certain major-general disregarded orders to stay in quarantine overnight so that Dr. White and his staff might inspect the men for jaundice by daylight, in order that such visible symptoms of yellow fever might be detected and further examined. Not only did the officer violate the quarantine by landing his troops; he also sent Dr. White an 800 word telegram, signed "Chairman of the Republican National Committee."

Dr. White and two other high officers decided the violation was a matter for the President's personal attention. It was at that point that the Republican President earned the high regard of Joseph Hill White who, after all, had been reared in the Southern Democratic tradition. The President read the offending telegram, frowned, was silent a moment, and then issued an order to the following effect: "Tell Major-General ———— to put his division back aboard ship, return to quarantine, and stay there till they are all inspected—and tell him, too, that that 800 word telegram is to be paid for by him personally, for it is not in line of duty and he has violated the laws of the United States. The matter of disciplining him will be taken up later."

And he recalls how it was a trick of circumstance and the failure of the Bull Moose party that prevented his appointment as Surgeon-General of the United States Public Health Service, for Theodore Roosevelt had already indicated his intention of recommending him for that position. But the

differences between Roosevelt and Taft were too sharp, and Taft could not see his way clear to appoint Roosevelt's man.

Central America has many memories for the man who was responsible for clearing it of yellow fever, and one of the pleasantest was his trip to Guatamala City, a few years ago, when with two of his daughters he decided to spend the winter there. Arriving in the Republic, they found the private railroad car of the President awaiting their convenience. When they made a courtesy call to the Executive Mansion they discovered their host to be the same man who, many years before, had worked under Dr. White's direction in helping to rid his country of yellow fever. Before the visit was over he personally conferred upon Dr. White the Order of the Quetzal, the first time that a foreigner had been so honored by the highest decoration given by the Guatamalan government.

Ninety years and a distinguished career have brought him many offices and honors: Chairman of the Section on Hygiene and Sanitary Science of the American Medical Association; President of the American Society of Tropical Medicine; U. S. delegate to the International Sanitary Conference in Montevideo in 1920; first President of the American Leprosy Commission . . . the list is long and impressive, and the man who has made the achievements today makes one think of three other famous old men with alert minds at a great age—Doctors Silas Weir Mitchell and William Williams Keen of Philadelphia, and Mr. Justice Oliver Wendell Holmes of the United States Supreme Court. Like them, Joseph Hill White is a 10-talent man, working in season and out for the good of his fellow man. Today he is a distinguished, gallant gentleman, a wonderful old man with what the late Dr. J. Chalmers daCosta would call "a redoubtable personality," and withal a most lovable character to know.

Today in the Church of the Pilgrims (Southern Presbyterian) in Washington, there is a memorial window to the memory of the late Emily Humber White and to Dr. White while he yet lives. At the dedication of the White Memorial window Dr. Andrew Reed Bird, as minister, paid high tribute to Mrs. White, and said, of her husband, "Dr. White has lived a life of extraordinary usefulness. A volume would be required to recount the vital service which God has rendered through him to individuals and to great masses of the population of North and South America. It would be fascinating reading to scan the history of individuals, both white and black, whom he has rescued from distress and enabled to become, in their turn, constructive citizens on several continents. His work in fighting the ravages of yellow fever in association with Walter Reed and other scientists has saved the lives of literally innumerable families throughout the years, and will do the same for generations yet unborn."

FREDERICK R. TAYLOR, M.D.

An Experiment In Hypnotism—(Painting by B. Falkenberg, 1893)

Consultation Service

This special consultation information service is offered as a regular monthly feature of *Postgraduate Medicine*. Subscribers are invited to call on this Service for answers to difficult medical problems from members of our Editorial Board and our Editorial Consultants best qualified to help. Each question will be answered by mail and those of general interest will be published each month. Address all communications to Consultation Service, *Postgraduate Medicine*, 516 Essex Building, Minneapolis 3, Minnesota.

INDICATIONS FOR NORMAL LABOR IN PATIENT PREVIOUSLY DELIVERED BY CESAREAN SECTION

QUESTION: A maternity patient of mine had a placenta previa with her first pregnancy. This pregnancy was terminated by cesarean section at eight months due to repeated hemorrhages. A living female infant, weighing four pounds, 12 ounces, was delivered. The type of section performed was a Waters extraperitoneal. This patient is now in her second pregnancy and wishes to know if this baby could be delivered normally. Her physical condition is good, pelvic measurements are ample and there are no unusual symptoms. The second baby is due on February 3, 1951. The cesarean section was performed on July 11, 1947.

Is a normal labor possible or advisable? The mother might be considered a primipara as far as labor is concerned.

M.D.—British Columbia

ANSWER: Normal labor is both possible and advisable for this patient provided certain conditions are met. The postoperative course following her section should have been normal. Any evidence of infection might indicate weakening of the uterine scar and should lead to repeat cesarean section. The patient should be warned to immediately notify the physician of any severe abdominal pain or soreness during the last trimester of pregnancy. Before the onset of labor soft tissue x-ray of the abdomen from the lateral view should be made to rule out location of the placenta under the old scar.

If these conditions are met, then the patient may be allowed to labor provided a physician is in constant attendance during labor and that facilities are provided for immediate laparotomy and transfusion, should signs of uterine rupture develop. The uterine scar of an extraperitoneal section is similar to that of a low cervical cesarean section in location and both are less liable to rupture than the scar of a classical cesarean section.

PROPHYLAXIS AND TREATMENT OF MALARIA

QUESTION: I have a patient who is soon to depart for Indonesia as a missionary. What is the best drug for prophylaxis and treatment of malaria?

M.D.—South Dakota

ANSWER: Many drugs are quite effective in suppressing the clinical manifestations of malaria, including quinine, ATABRINE, and chloroquine. Chloroquine diphosphate (ARALEN) probably represents the most satisfactory drug so far as consistency of effect and freedom from undesirable side reactions are concerned. The recommended dose of chloroquine for prophylaxis of malaria is one 0.5 gm. tablet taken once weekly by mouth. For treatment of an acute attack of malaria due to *Plasmodium vivax*, the recommended dose is 1.0 gm. followed in six hours by 0.5 gm., then 0.5 gm. daily for two days. The course should be somewhat longer in the case of the malignant tertian form of malaria.

There have been no serious toxic reactions to chloroquine reported, but patients occasionally complain of itching of the palms and soles, and rarely of nausea.

Once one is out of the endemic area of malaria, the possibility of attempting to cure the disease rather than merely suppressing it should be considered. Coggeshall and Rice have reported (J.A.M.A. 139:437-439 [February 12] 1949) encouraging results with PENTOQUINE, a compound related chemically to plasmodium. They gave 30 mg. three times daily along with 1.0 gm. of quinine sulfate three times daily for fourteen days.

ELLARD M. YOW

PERTUSSIS-DIPHTHERIA-TETANUS IMMUNIZATION

QUESTION: (1) If an infant was immunized against pertussis, diphtheria and tetanus, how often should stimulating doses be given?

(2) Does injection of tetanus and/or diphtheria toxoid sometimes cause severe reactions in children over 6 years old? Which is more apt to cause a severe reaction in an older child—a stimulating "booster" injection of toxoid or a primary injection of toxoid?

(3) Is it necessary and is it practical to do a sensitivity test (Moloney test) in all older children before injecting tetanus and/or diphtheria toxoid?

M.D.—Connecticut

ANSWER: (1) An infant who has already been immunized against pertussis, diphtheria and tetanus is maintained in a state of immunization, according to our present knowledge, for a period of at least one year. Booster doses might well be given each year during the most critical period of early childhood and once every two or three years thereafter until late childhood when this is required less frequently.

(2) Injection of tetanus and/or diphtheria toxoid

causes severe reactions in children over 6 years of age occasionally but these should not prevent one from giving protective doses in any but the most susceptible person. The primary injection of toxoid is probably more likely to give a reaction than the booster injection.

(3) It would seem to me hardly necessary to do the sensitivity test in most children before injecting tetanus or diphtheria toxoid because these contain so little foreign protein. In very highly allergic older children some precaution, such as the sensitivity test, is more than justifiable.

IRVINE MCQUARRIE

ALUMINUM ACETATE PREPARATION FOR PAGET'S DISEASE

QUESTION: Have you any information available regarding the use of the aluminum acetate mixture mentioned as possessing some merit in treatment of Paget's disease (osteitis deformans). What strength solution is used, etc.?

M.D.—California

ANSWER: The use of an aluminum acetate preparation in the treatment of Paget's disease is recommended by A. J. Helfet in an article which appeared in the *British Journal of Surgery* in April, 1940.

This preparation has been used with some satisfactory results, at least from the standpoint of relief from symptoms. The rationale for the treatment and the physiologic action are by no means proved to be on a sound chemical basis, but at least the agent does seem to help some cases.

It is prepared as follows:

Sol. alum. acetate (Burow's sol.)	Oz.	V
Syr. tolu	Oz.	III
Honey, qs. ad	Oz.	XIV

Sig.: Dram q. i. d. p.c.

It is very important that the aluminum acetate be lead-free, and from this the Burow's solution can be prepared. It is prepared according to the formula on page 235 of the *National Formulary,* seventh edition.

A dram should be given four times a day. The patient must take at least a pint of milk a day along with it; otherwise the patient will tend to get too little calcium.

SULFATHALIDINE THERAPY FOR ULCERATIVE COLITIS

QUESTION: Will you please advise me if it is necessary or advisable to give Chloromycetin along with Sulfathalidine to a patient with minimal chronic ulcerative colitis who is running no fever, has no diarrhea, severe cramps or bleeding at present.

I would also like to know how long sulfathalidine should be continued in such a case.

The patient has an early segmental lesion about 2 inches in length just above the sigmoid and there are no stenoses, polyps, diverticula or other lesions present except mucosal ulceration. She receives 4 gm. of sulfathalidine daily, Donnatal tablets, one three times a day, 20 minutes before meals, crude liver and B complex parenterally three times weekly and is on a bland, low residue diet.

M.D.—Ohio

ANSWER: There seems little reason to give more than one antibiotic drug in the treatment of a minimal segmental lesion due to chronic ulcerative colitis. Sulfathalidine has proved its usefulness in decreasing the bacterial flora of the stool and can be continued for a period of four weeks. The effect of chloromycetin is apt to be lost after a few days. Streptomycin, aureomycin and terramycin are probably equally effective.

The most important part of the therapy is continued medical supportive therapy with intermittent use of antispasmodics and continued use of adequate vitamin intake by mouth and a high calorie, bland, low residue diet. Such a patient should have a period of bed rest during active therapy. There seems to be no surgical indication in this patient.

RICHARD B. CATTELL

GENERAL PRURITUS WITHOUT APPARENT CAUSE

QUESTION: I have a 16-year-old girl who has complained the past three or four months of severe generalized pruritus with exercise. She describes it as a red rash all over the body, with occasional appearance of white lumps.

History reveals no previous allergies, no new clothes that would be significant. It appears if she runs with a winter coat on or if she is in gym class. I have had her on a temporary elimination diet without any significant information. She is definitely relieved by antihistamine, which seems to lessen the severity a great deal.

Would you please give me some information as to possible etiology in this case?

M.D.—Wisconsin

ANSWER: It seems most probable that this girl has urticaria or hives. Urticarial response in susceptible individuals is caused by such physical agents as trauma, heat, cold and light. This is apparently a heat urticaria brought on by exercise.

The causation of hives precipitated by physical agents has never been determined. Such urticarias are usually considered allergic yet in the majority of cases no specifically acquired sensitivity can be demonstrated.

Unfortunately little can be done for these individuals. Histamine injections have proved of value in a limited number of cases. The antihistaminic drugs minimize the symptoms but are not curative; they must be continued indefinitely. In a moderately high percentage of cases the symptoms disappear spontaneously after having been present for months or years.

BEDFORD SHELMIRE